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Revision of the Bermuda Ferns.

BY BENJAMIN D. GILBERT.

The two chief authorities on Bermuda ferns are Governor J. H. Lefroy, whose list of Bermuda plants was published by The Smithsonian Institute in its Bulletin No. 25, in 1884; and the botanical volume of The Challenger Expedition, published by the British government in 1885, the material for which was collected between 1873 and 1877, and was determined by Mr. W. B. Hemsley. Another small volume, entitled "Plants of the Bermudas," by Oswald A. Reade, was also published at Hamilton, Bermuda, in 1885. It is very imperfect in its list of Filices, but is entitled to recognition on account of one species given in it, which neither of the other works mentions.

It should be remembered that the Bermudas are not tropical islands and that the fern flora is small in comparison with that of the West Indies. For instance, the ferns comprise more than one fifth of the flowering plants and vascular cryptogams growing in Jamaica, while in Bermuda they form only about one fourteenth part of the whole number. There is neither sufficient moisture nor sufficient heat to promote their growth. At the same time there are some very good and desirable species. Only one fern, however, is generally distributed throughout the islands: all the others being confined principally to two kinds of localities having distinct characteristics of their own. These localities are what are known, first, as "the marshes," and second, as "the caves."

The marshes are hardly what we would call swamps. They are large, level plats at the foot of hills or between them, where some

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water collects in a rainy period, but which can always be traversed on foot except for a sluice way, perhaps eight to ten feet broad, which apparently has no current and no outlet, and which is often completely covered with duckweed (*Lemna minor*). On the margins of these dark sluggish waters grow large numbers of dog-bush (*Baccharis heterophylla*), while in the marshes themselves grow the omnipresent juniper, occasional large specimens of the palmetto (*Sabal Palmetto*), several species of Cyperaceous plants and quantities of ferns belonging to five or six species only.

There are two kinds of so-called "caves" in Bermuda. Several of them are genuine caves, and there the ferns grow, not inside the caves, but on the rocks and debris about their entrances. The other caves are simply holes in the earth, open to sun, air and rain, sometimes twelve to fifteen feet across at the top and as many feet deep; sometimes 150 feet across and sixty to seventy-five feet deep. Geologists say that all these were once genuine caves, the roofs of which became too heavy to hold themselves up and fell into the interior, carrying with them whatever vegetation had grown on the surface. Darwin, in his "Voyage of a Naturalist," tells us that at the Galapagos Islands also "the tops of caverns have fallen in, leaving circular pits with steep sides." These caves are shady; they retain moisture longer than the upper surface; they are protected from the severe winds; and as a consequence they are the haunts of the rarest and choicest ferns of the islands. The descent into these cavities is always steep, sometimes precipitous. They occur chiefly in what is known as "the Walsingham tract," a peninsula lying between Harrington sound on the west and Castle Harbor on the east, about three miles in length and one to two miles in width. It takes its name from the former residence of Tom Moore, the Irish poet, who was appointed to a government office in Bermuda and lived there for about six months, but was too fond of the gaieties of London life to remain longer.

As there are only twenty-five species and varieties of ferns in Bermuda, I propose to speak of each separately and of the locality in which it grows.

ADIANTUM CAPILLUS-VENERIS L.

None of the authorities credit Bermuda with this species, but it will certainly have to be included, although probably naturalized

at a comparatively late date. The last day that I was out collecting in the Walsingham district I came across some fronds that looked quite different from the variety *A. Walsingense*, but I had seen so much of this fern that I supposed these plants were only another form of that variety and consequently gathered only two or three fronds. On returning to America and unpacking my collection, these fronds struck me at once as being larger and more open, with pinnae more deeply cut and more cuneate, than any other *Adianta* in the collection. On consulting Governor Lefroy's list more carefully, it was found that *A. capillus-Veneris* was one of the ferns which he "planted out in promising localities about Paynter's Vale (Walsingham district) with a view to their introduction." In the case of this species his effort was evidently successful, and it may now be counted as one of the naturalized species of the island. Very likely it would have been found in other spots visited, if I had been on the look-out for it.

ADIANTUM BELLUM Moore.

Moore's description of this species was originally published in the Gardener's Chronicle, London, 1879. It was reproduced in the Voyage of H. M. S. Challenger, 1885, but as these publications are to be found only in a few of the larger libraries of this country, and the description is short, it is reprinted here.

"Fronds tufted, 3 to 6 inches high, bipinnate, ovato-lanceolate; pinnae of 3 to 6 pinnules ½ to 1½ inch long; pinnules cuneate or irregularly transverse-oblong, the somewhat larger terminal ones cuneate and divided into two or three shallow lobes, the margin erose, all shortly pedicellate, the pedicels hairlike, not articulated with the pinnule but showing at their apex a short y-shaped ebonous furcation which passes into the flabellate venation; sori various, two or three on the smaller pinnules short and roundish or longer and sublunate, situated at the apex of the shallow lobes; indusium entire; caudex thin, shortly creeping with criniform scales; stipes and rachis ebonous, smooth."

This is the common fern of the islands. It grows everywhere, on exposed rock surfaces that line the roadsides, on garden walls and sometimes but not often in soil. Moore's description should be modified by making the size 3 to 8 inches, the fronds bi-tripinnate and the sori long and broad in comparison with the size of

pinnules, of which they nearly cover the entire upper edge. The indusium also is not entire, but especially when young is erosed similar to the edges of the pinnules.

ADIANTUM BELLUM WALSINGENSE var. nov.

Rhizome stout, somewhat woody, repent, sending roots into the crevices of rocks: stipes 5–9 in. long, dark ebonous, shining, furrowed and at base flattened, with a few linear light brown scales; rachis conform, smooth; frond 9–12 in. long, 5–7 in. wide, tri-quadripinnate; pinnae 3–6 in. long, lower opposite, upper alternate, segments 3/8–1/2 in. long, 1/4 in. wide, sometimes cuneate, sometimes almost dimidiate, more often the latter with lower edge straight and entire, upper and outer edge with 2–3 large lobes; sinuses shallow, generally an upper and a side lobe, edges of barren pinnules finely erose with a vein running into each tooth, venation flabellate, very distinct, texture thin, herbaceous: sori straight whether long or short, when only one sorus generally on side lobe; indusium broad and finely erose like edges of pinnules.

This variety is much larger than the species. *A. bellum* as a rule is very fully fruited even on the smallest fronds. *A. Walsingense*, on the contrary, fruits sparingly in comparison with the large number of pinnules, which are generally two-lobed, having an upper and a side lobe. The variety shows a preference for bearing only one sorus which in that case is situated on the side lobe, thus giving the pinnules a one-sided appearance and easily distinguishing the variety.

PTERIS LONGIFOLIA L.

Neither Lefroy nor Hemsley gives this species as native or naturalized in Bermuda, but it is the one species which Reade adds to the list. It is met with quite frequently about the city of Hamilton, growing in the crevices of walls or wherever the wind may have lodged a few spores. The species is well established and is likely to increase rather than diminish.

PTERIS HETEROPHYLLA L.

This fern is found in several of the open caves and on the cliffs of the Walsingham tract. Its local name is "parsley fern," and it has been gathered so much for decoration that it is becoming

scarce except in the more inaccessible places. It seems difficult to find it in fruit, but in favorable locations the fronds attain a wonderful size, being sometimes nearly 3 feet in length, when the normal size elsewhere is only 6–12 inches. It is a West Indian and Brazilian species.

PTERIS AQUILINA CAUDATA L.

While this species is abundant in the marshes, it is peculiar in its mode of growth. In Devonshire marsh, where it grows most luxuriantly, it may frequently be seen 10–12 feet high. It seems ambitious to overtop everything near it; so it pushes up through the *Baccharis* bushes and all other undershrubs and ripples over them in shining waves of green, forming one of the most beautiful sights in the island. The fronds are hard, glossy and coriaceous, showing its siliceous character very distinctly. The farmers living in the vicinity go into the marshes and cut quantities of *Pteris* and *Osmunda* as bedding for their animals.

WOODWARDIA VIRGINICA Smith.

Governor Lefroy states that this fern is found only in Pembroke marsh and is not very abundant there. I found it quite plentiful on the north side of Devonshire marsh, where, in its young and unfruited stages it was liable to be confounded with *Osmunda cinnamomea* unless one took pains to notice its different mode of growth, standing in shade where it was sure to get plenty of water, and never with roots raised above the surrounding soil.

ASPLENIUM DENTATUM L.

Frequent on rocks in Walsingham district, covering surfaces 3 or 4 feet square, and sometimes producing fronds 4 to 5 inches long.

ASPLENIUM TRICHOMANES MAJUS Mett.

This fern, which is quite common in Bermuda is nearly identical with the form figured and described by Hooker & Greville in "Icones Filicum" as *Asplenium anceps* Solander, but afterward placed by Hooker in his "Species Filicum" as var. *majus* of *A. Trichomanes*. It is the same form that is found in Madeira and the Azores. To the casual observer it looks quite distinct from

the European and North American forms of *A. Trichomanes*, but comparison with a considerable number of specimens shows that the two forms gradually shade into each other. In Bermuda the fronds often measure 12 to 15 inches in length and are fully one inch wide. A peculiar feature of the plant in its native condition is that the pinnae rise like a series of numerous shelves one above another, instead of lying in the same plane with the rachis as in the majority of ferns. The fronds also grow upright, whereas in *A. Trichomanes* proper they spread out more in the form of a rosette.

ASPLENIUM MYRIOPHYLLUM Presl.

Lefroy says that this is "The rarest of Bermuda ferns and is only found about the Church cave." Hemsley quotes Paynter's Vale as a locality, but I could not find it there, although I had a guide who was thoroughly familiar with that part of the island and took me to every spot where ferns were likely to be found. I obtained it at the Church cave, but it is very scarce there and liable to extinction. It exactly agrees with the Jamaica and Florida forms.

ASPLENIUM LAFFANIANUM Baker.

This is another of the endemic species of Bermuda. Governor Lefroy supposed it to be a form of *A. crenulatum* Baker, and published it as such. A plant was sent to Kew for cultivation by Governor Laffan, and proving to be entirely new it was dedicated to him. This also has come to be a very rare fern in the islands. The only specimen I possess came from a plant in the fernery of Mrs. William Bluck, Hamilton, which she obtained at the Church cave some years ago. Mr. and Mrs. Bluck accompanied me to that locality, hoping that we might procure a few specimens; but we were not successful, nor was I able to find it on a later visit to the same cave. Lefroy said it was "found chiefly in the Walsingham tract, and is not very common." Mr. Baker puts it "near *A. crenulatum*," but it seems to come nearer *A. Mildei* Kuhn which was found in the Andes of Equador by Jameson.

DRYOPTERIS ACULEATA (L.) Kuntze.

Neither Lefroy nor Reade mentions this species. Hemsley gives it as growing at "the caves," but without special locality.

Of course he had not visited the islands, but was working on specimens ostensibly collected there. The species is so common and so well known in Europe that there could be no question of error in its determination. The only suggestion might be that, as the Challenger collections were obtained from a large number of islands in different parts of the world, a few fronds of this common fern might by accident have found their way into a collection where they did not belong. I saw nothing of it in Bermuda, but it may be a species that has disappeared from those islands, and being in the Kew collection it must stand as a Bermuda species, at least of a former time.

DRYOPTERIS CAPENSIS (Willd.) Gilbert.

This noble species, which is denominated the "ten-days fern" by Bermudians, because it will keep green ten days after it is cut, grows in the Devonshire marsh, but, as Lefroy says, "it is in danger of extermination, not being abundant." He transferred some plants to Pembroke marsh, but they do not seem to have become established. I found one plant (or "tree," as they call all single plants in Bermuda) of it under a ledge at Paynter's Vale, but that was the only other locality where it was seen.

DRYOPTERIS AMPLA (Mett.) Gilbert.

Mr. Hemsley cites Paynter's Vale for this fern. Governor Lefroy says it is "common by roadsides." There is no reason to doubt that the species grows or has grown in Bermuda, but it is doubtful if it was ever "common." Had it been so I must have seen some trace of it. Most of the species of ferns are in their best estate in March and April, but this species may appear later in the season, which would account for my not finding it. It belongs especially to the West Indies and South America.

DRYOPTERIS PATENS (Sw.) Kuntze.

This fern is, next to *Adiantum bellum*, the most common of any in Bermuda. It grows in both dry and moist ground, but in the marshes it attains its largest size, frequently reaching a height of 4 feet and a width of 1½ feet.

DRYOPTERIS THELYPTERIS (L.) A. Gray.

Lefroy says this is found "along the north side of Pembroke marsh and not elsewhere," but I found it in a small marsh on the north side of Hamilton, where it grows rather sparingly among dog-bush and *Rhyncospora stellata*.

DRYOPTERIS MOLLIS (Desv.) Kuntze.

Although this fern is given by Hemsley, he tells us that there is no specimen of it in the Kew herbarium from Bermuda. Lefroy states that he planted it out, but does not include it in his list, from which it is to be inferred that the species did not become established. If Hemsley had no specimen of it from Bermuda, it seems possible that he may have accepted Lefroy's effort to naturalize it as an accomplished fact and reported it in accordance therewith. Reade gives it, probably on the same authority, or he might easily have mistaken a specimen of *D. Bermudiana* or even of *D. patens* for *D. mollis*. At all events, it does not seem probable that the species grows in Bermuda now.

DRYOPTERIS VILLOSA (Sw.) Kuntze.

This fern is said by Lefroy to be pretty abundant and to grow in dry places. I found it plentiful in a long "cave" south of the Church cave and also in Trott's cave; also growing on the face of the cliff at Lovers' Nook, Paynter's Vale. The plants were large and apparently very fine, but it was difficult to select fronds that were not ragged or imperfect, although the fern was just in its prime. In fact, this was true of several of the larger ferns, but it may have been caused by the uncommonly dry weather of the month of March.

DRYOPTERIS BERMUDIANA (Baker) Gilbert.

As this is one of the endemic species of Bermuda, and as Mr. Baker's short description of it is in Latin, I will give one in English, drawn from my own specimens.

Caudex thick, shortly creeping, producing a mass of dark brown roots chaffy at the crown with lanceolate long-pointed brown scales ¼ in. long: stipes about 6 in. long with same scales at base, finely pilose; rachis stramineous like stipes and densely pilose: frond 10–16 in. long, 3–6 in. wide, pinnate, pinnae 1½–3 in. long,

½–1 in. wide with very short petioles, lower pinnae variable, usually slightly reduced but sometimes largest, cut half way to the midrib, very blunt, point entire, dark green on upper side and somewhat canescent, paler on under side: segments uneven in length, blunt, close, entire, basal segments on one or both sides enlarged, texture subcoriaceous: veins beneath pilose, regularly pinnate, 5–7-jugate, lowest veinlets uniting and sending a vein to the sinus as in *Eu-Nephrodium*, simple in smaller specimens and in upper half of frond, but in larger and more mature specimens forked from the middle on inner half of pinnae often uniting at the edge and forming a pentagonal areole, thus bringing the species into the Pleocnemia section: sori small, situated on middle of vein when latter is simple, and at or just above the fork on the anterior veinlet when branched; involucre small, reniform, fugacious.

Mr. Baker places this in *Eu-Nephrodium*, but the probability is that his specimens were not fully developed, although the frond figured in Voyage of H. M. S. Challenger seems to be nearly full sized. The venation of the figure, however, is quite indistinct and does not convey a correct impression of the fern. There seems to be no doubt that it belongs in *Pleocnemia*, and in that light it becomes a highly interesting form, since there is but one species of that section reported as belonging to the western hemisphere, viz., *P. dissidens* from Porto Rico, which Mettenius originally described, but which neither Hooker nor Baker had ever seen.

It should be mentioned that Governor Lefroy supposed this fern to be *Nephrodium tetragonum* Hook. and so catalogued it.

NEPHROLEPIS EXALTATA Schott.

Given by all authorities and common among rocks in the Walsingham district.

POLYPODIUM PLUMULA H.B.K.

Polypodium elasticum Rich.

Both Lefroy and Hemsley give this species under the latter name, and I found it at Paynter's Vale, the locality named for it by Hemsley. Lefroy says it is "found chiefly in the Walsingham tract and not very common." It grew very sparingly this year and the weather had been so dry that the fronds were curled so that it was difficult to make good specimens of them, thus justifying the name *elasticum*, although the older name must take preference. It is a common West Indian species.

POLYPODIUM PECTINATUM L.

Hemsley is the only authority for this species. He gives Walsingham as a habitat, but no special locality. I did not find it, but as it is one of the common ferns of the West Indies I have no doubt it grows in Bermuda. Its superficial appearance is so much like that of *P. Plumula* that it would not be strange if Governor Lefroy mistook it for that species.

ACROSTICHUM AUREUM L.

All the authorities give this as abundant in brackish marshes, but everybody formerly took it for granted that all the plants of this genus growing in Bermuda were of one species. In the marshes on the south shore they do not attain the great size of the plants in the Devonshire marsh, and I feel certain that the former belong to *A. aureum*, as they grow in salt or very brackish water, which is the favorite habitat of *aureum*. I did not collect it there, or make any close examination of the species at the time, supposing, like everybody else, that the plants in both localities belonged to the same species.

ACROSTICHUM LOMARIOIDES Jenman.

This is the species recently separated by Jenman from the familiar *A. aureum*. It is characterized, he states, by "its much larger size, numerous crowded fronds, the barren and fertile being uniformly separate—all the pinnae of the one being barren and all of the other fertile—much more sessile leaflets (turned transversely with the rachis, the plane to the sky like the blades of a step-ladder), intestiniform translucent pale-colored corpuscles covering the sporangia, which give a pale pruinose color to the soriferous under surfaces." I might add that the meshes of venation are much finer and point more directly to the edge, and that the costal areoles, instead of lying lengthwise along the midrib, are generally longer the other way and point outward. The venation is raised on the under side and is more distinct than it is in *A. aureum*, looking like honey-comb, as if it were made of whitish-yellow wax, while in *A. aureum* it is of the same color as the rest of the frond, or darker.

The specimens are very stiff and difficult to press on account

of the peculiar position of the pinnae mentioned by Jenman, which makes it necessary to twist them around in order to have them lie in a plane with the rachis.

Jenman gives Bermuda as one of the habitats of this species. The Devonshire marsh, where it grows, lies in the central valley of the large center island known as "the Mainland," and is out of the reach of tide water. The plants strike every one who sees them as being magnificent in size, reaching far above the head of any man, sometimes to the height of eight or nine feet. Mr. Jenman says: "This is the plant figured in Eat. Ferns N. Am. for *A. aureum*, though the true *aureum* is also found in Florida. It (*A. lomarioides*) ranges from Florida and the Bahamas down through the West Indies and Guianas to the Brazils." This, therefore, adds another species to the ferns of our own country. Eaton figures only the fertile frond, but shows a section of a pinna with the sporangia removed, thus disclosing the venation. This is represented as running rather more oblique to the rachis than it does in *A. lomarioides*, but in other respects the figure is very good. It is taken from an Indian River specimen, where, Eaton tells us, the fronds grow very tall and have all the pinnae of the fertile frond fertile and closely appressed to the rachis; which is a correct, condensed description of *A. lomarioides*.

OSMUNDA REGALIS L.

Abundant in Pembroke and Devonshire marshes.

OSMUNDA CINNAMOMEA L.

Abundant in same localities and very luxuriant in growth.

In addition to the above named species, Governor Lefroy put at the end of his list *Blechnum occidentale* L. which, he said, "was planted out in suitable places in 1877." Neither Hemsley nor Reade seems to have had any native specimen of it, nor is there any evidence of its existence there now. It must therefore be regarded as another case of failure to become naturalized.

If we eliminate from this list the species *Dryopteris mollis*, which was evidently catalogued through some mistake, there will remain 25 species and varieties of ferns that may properly be regarded as native or naturalized in Bermuda. An analysis of

these species and of the countries where they are known to be indigenous shows that 15 belong to the West Indies, 3 to the continent of North America, 2 to Europe and 1 to the Azores; while 4 are endemic, being the product of Bermuda alone. Thus it is evident that the presence of a great majority of the species can be accounted for by transmission on the waves or winds from comparatively nearby sources. Even the Azorean form of *Asplenium Trichomanes* may well be regarded as a development of that species resulting from insular conditions in both cases. *Adiantum Capillus-Veneris* and *Dryopteris aculeata* are really denizens of the world and liable to be found almost anywhere. There remain the four distinctive species and variety belonging to Bermuda alone; and I leave it for the speculative botanist to determine whether these are the results of evolution, or whether they are the remains of a flora that existed in an earlier geological period when a much greater land surface existed where the Bermudas now lie, and of which they formed the central and most elevated portion.

There is a curious relation between the fern flora of Bermuda and that of Juan Fernandez. The latter is 18 miles long and 6 miles broad, with mountains 3,000 ft. high. Thus while it is not so long as Bermuda, it is so much wider that the superficial area must be somewhat greater, while the high elevation of the land affords a much greater variety of climatic conditions. Their distance from the equator is approximately the same, Bermuda being 32° 15′ N. and Juan Fernandez 33° 37′ S. But while Bermuda is 600 miles from the coast of North America, Juan Fernandez is only 400 miles from the coast of South America. Alfred Russell Wallace informs us that there are 24 species of ferns in Juan Fernandez and that 4 of these are "quite peculiar," by which he means that they are endemic. This lacks only one of the same number of species as are found in Bermuda, and what is still more curious, there is exactly the same number of endemic species. Mr. Wallace declares that the latter fact indicates "the remote period when Juan Fernandez first received its vegetation." If the same reasoning be applied to Bermuda, we shall be led to infer that a portion of the main island at least is of very ancient origin, and that the peculiar species are survivals rather than developments.

Studies in the Botany of the Southeastern United States.—XV.

By John K. Small.

I. NOTEWORTHY SPECIES.

Smilax Morongii.

Smilax megacarpa Morong, Bull. Torr. Club, **21**: 434. 1894.

The specific name under which this characteristic plant was first described was preoccupied* at the time of its publication. Henceforth the species may be designated by the name of the original describer.

Baptisia megacarpa Chapm.; T. & G. Fl. N. A. **1**: 376. 1838.

During the summer of 1895, I found this local species abundantly scattered through swamps of the Flint River below Albany, Georgia. The plants there continued to flower after they had produced mature fruit. The trees forming the woods of the part of the river swamp in which this *Baptisia* grew were almost exclusively magnificent specimens of *Acer Floridanum.*

Euphorbia apocynifolia Small, Bull. Torr. Club, **25**: 467. S. 10, 1898.

Euphorbia corollata, *θ apocynifolia* Millspaugh, Bot. Gaz. **26**: 268. O. 15, 1898.

Since the publication of this species excellent specimens have reached the herbarium of the New York Botanical Garden, through the National Museum. They were collected at Meridian, Mississippi, on October 10, 1896, by Mr. Charles Schuchert. They are almost exactly like the type and possess all the characters that separate the species so obviously and abundantly from its relatives.

Ceanothus serpyllifolius Nutt. Gen. **1**: 154. 1818.

In the latest interpretation† of this species the author cites a single collection, the original. The species was first collected by

*A. DC. in DC. Monog. Phaner. **1**: 186.

† Syn. Fl. N. A. **1**: Part **1**. Fascicle **2**, 410. 1897.

Dr. Baldwin, near St. Mary's, in southeastern Georgia, in the early part of this century. As far as I can learn the species was not met with in the field since the time of the original collection, until Mr. Lewton found handsome specimens of it about Lake Brantley, Orange County, Florida, on July 10, 1894. It is interesting to get the species from a point several hundred miles south of the original station.

SIDA RUBROMARGINATA Nash, Bull. Torr. Club, **23**: 102. 1896.

This excellent species was collected many years ago by Rugel. I find a specimen of it in the Columbia University Herbarium, the label bearing the following record: Ad vis, prope Tallahassee, Florida, legit Rugel, Mai, 1843.

CROTONOPSIS SPINOSA Nash, Bull. Torr. Club, **22**: 157. 1895.

Mr. Lewton found this lately described species abundant in Orange County, Florida, during the summer of 1894. This collection makes the fourth known locality for the species.

CITRULLUS CITRULLUS (L.).

Cucurbita Citrullus L. Sp. Pl. 1010. 1753.

Citrullus vulgaris Schrad. Linnaea, **12**: 412. 1838.

This foreign and widely cultivated species has now become sufficiently well established in waste grounds, along railroads and in similar places to be recognized as a part of our introduced flora. I have collected it at many points in Georgia and North Carolina.

II. HITHERTO UNDESCRIBED SPECIES.

MELANTHIUM DISPERSUM.

Perennial, glabrate below the inflorescence. Stems erect, 6–12 dm. tall, simple below the panicle, thence zigzag and scurfy pubescent, rather slender: leaves without distinction between blade and petiole, narrowly linear, elongated, 3–8 dm. long, sheathing the stem for several centimeters: panicle ample, open; branches zigzag, widely ascending or spreading: bracts 3–10 cm. long, obtuse: pedicels spreading, 8–12 mm. long, rigid: perianth scurfy without, 12–15 mm. broad; segments thickish; blades oblong, obtuse, with 2 glands at the bases, entire, several times longer than the claws: capsules (barely mature) ovoid, 7–9 mm. long.

In woods, western Florida, summer.

Near to *Melanthium Virginicum* but with a different aspect, the leaves are longer and narrower and the panicle, instead of being narrow and with an elongated central axis, is broad, with few corymbosely arranged widely ascending branches and no prolonged main axis. On comparing *Melanthium dispersum* with specimens of *Melanthium Virginicum* from Florida and the Northern States, in addition to the above cited characters, we find the pedicels to be much stouter, and much more widely separated, the flowers less crowded, there being only about one half as many to each panicle and the segments of the perianth with shorter claws.

The specimens on which the species is based were collected by Mr. A. H. Curtiss in Walton county, Florida, in 1885.

SMILAX TENUIS.

Perennial, unarmed. Stems herbaceous, elongated, apparently 1 meter long or longer, commonly simple, slender, glabrous: leaves rather few; blades thin, triangular-ovate, 5–9 cm. long, acuminate, coarsely erose-denticulate, 5-nerved, with an inconspicuous sprinkling of minute hairs beneath, truncate at the base: petioles slender, as long as the blades or shorter: tendrils few, filiform, sometimes developed from the sheaths of the upper leaves: peduncles as long as the subtending leaves or longer, nearly filiform: pedicels (staminate) 15–25, 6–8 mm. long: perianth greenish; segments oblong or linear-oblong, 2.5 mm. long: filaments barely twice as long as the anthers.

In woods, Louisana. Spring.

The nearest described relative of *Smilax tenuis* is *Smilax peduncularis*, but the two species differ conspicuously in habit, the former is quite robust while the latter is very slender. The triangular-ovate leaf blades with their truncate bases and delicate nerves form a strong contrast with the larger, broader and thicker leaf blades of *Smilax peduncularis*, with their cordate bases and very stout prominent and more numerous nerves. The perianth of the newly described species is barely one half as large as that of its relative. The original specimens were collected by Dr. Hale, many years ago in Louisiana.

SMILAX DIVERSIFOLIA.

Perennial, unarmed. Stems herbaceous, 1–3 meters long, climbing, simple or sparingly branched, purplish: leaves numerous; blades

ovate or oval-ovate except those accompanying the peduncles, 3–5 cm. long, tipped with an abrupt slightly twisted point, dark green above, pale and minutely pubescent on the nerves and veins beneath, prominently 3-nerved and usually with 2 more indistinct nerves, truncate or subcordate at the base; blades of leaves accompanying the peduncles lanceolate, acuminate: petioles slender, one third to one half as long as the blades: tendrils filiform, developed at the majority of the nodes: peduncles stout, twice or thrice as long as the leaves: pedicels (pistillate) 20–25, 8–10 mm. long, slightly thickened upward: berries subglobose, about 5 mm. in diameter.

In river swamps, Georgia. Spring.

During the spring of 1895, I discovered a curious species of *Smilax* growing in the river swamps of southwestern Georgia, especially in the swamps along the Flint river. It is related to *Smilax herbacea*, but it is more slender and delicate. The leaves are characteristic, the blades are much smaller and more rounded except those accompanying the peduncles; these are wholly different in shape from the other leaf-blades, being lanceolate or narrowly lanceolate. The peduncles are conspicuously elongated and fully twice as long as the accompanying leaves. The original specimens were collected by the writer along the Flint river near Albany, Georgia, May 24–28, 1895.

SMILAX RENIFOLIA.

Perennial, shrubby, glabrous. Rootstocks not seen: stems elongated, climbing high over shrubs and trees, more or less distinctly angled: leaves numerous; blades reniform or deltoid-reniform, 3–7 cm. long, resembling those of *Celtis*, rounded and mucronate at the apex, entire, mostly broader than long, subcordate at the base: petioles 5–10 mm. long; stipular sheath fully half as long as the petioles, usually furnished with tendrils: peduncles of pistillate plants 10–20 mm. long, flattened, much longer than the petioles: pedicels 16–25, 2–3 mm. long: perianth greenish; segments linear or linear-oblong, 2 mm. long, acutish: berries black, subglobose.

Along streams, Texas. Spring.

This Texan *Smilax* is remarkable for its broad *Celtis*-like leaf-blades. These alone furnish a ready means of separating it from *Smilax rotundifolia* with which it has been confused.

The specimens from which the above description is taken were

collected by Mr. A. A. Heller along Bear Creek, Kerr county, Texas, on April 30, 1894, no. 1679.

SMILAX CINNAMOMIIFOLIA.

Perennial, glabrous. Stems high-climbing, sometimes 10–15 meters long, sparingly armed with slender spines, terete or nearly so: leaves alternate; blades lanceolate or ovate-lanceolate, those on vigorous shoots ample, normally 7–10 cm. long, acute or apiculate, entire, glaucous beneath, cuneate to truncate at the base: petioles 5–10 mm. long; stipular sheath about half as long as the petioles, usually furnished with tendrils: peduncles much longer than the petioles, slender, sometimes 4–5 cm. long at maturity: pedicels 5–10, 6–12 mm. long: perianth greenish; segments linear-oblong or slightly broadened upward, 4 mm. long: anthers mostly longer than the filaments: berries subglobose, about 10 mm. in diameter, bluish-black, lustrous under the glaucous coating.

In woods and rich soil, Alabama and Western Florida to Texas. Spring.

Smilax cinnamomifolia is a southern homologue of *Smilax glauca*, which species it resembles in habit. The leaf-blades are narrower, at maturity often resembling those of *Smilax lanceolata* and suggesting leaves of species of *Cinnamomum*. The upper surface is much more lustrous than that of the leaf-blades of *Smilax glauca* and the berries conspicuously large, commonly twice the size of those of *Smilax glauca*. The following specimens belong here:

Arkansas: Spirit Lake, Texarkana, *Heller*, no. 4109.

Alabama: Auburn, Lee County, November, 1895, *Underwood*.

GYROSTACHYS CONSTRICTA.

Perennial from coarse roots. Stems erect, 3–4 cm. tall, stout, simple: leaves mainly on the lower part of the stem, these linear or narrowly linear-spatulate, 1–2 dm. long, acute, narrowed into margined petioles; those higher up on the stem reduced to sheathing scales: spikes 5–10 cm. long, 2–2.5 cm. thick, closely flowered: bracts lanceolate, as long as the flowers or shorter, acuminate: lip 7–10 mm. long, nearly as long as the sepals and petals, constricted above the middle tip; ovate or deltoid-ovate, much shorter than the base; basé ovate, with 2 more or less incurved basal callosities.

In marshes, Louisiana. Fall.

A distinct species related to *Gyrostachys vernalis* but more robust and larger in all its parts. The leaf-blades are much broader and the dilated tip of the lip ovate with a more or less strongly truncate base as compared with the oval or suborbicular tip of the lip in *Gyrostachys vernalis*. The original specimens were collected by Dr. Hale in marshes, Louisiana, no. 444. There is a specimen of this species in Dr. Torrey's herbarium, collected by Prof. L. C. Beck, but no locality is given on the label.

GYROSTACHYS REVERCHONII.

Perennial, light green, 3–6 dm. tall: leaves few; blades various, those of the basal and lower stem leaves linear or slightly broadened upwards; those of upper stem-leaves linear, 1–2 dm. long, acute or acuminate, reduced to sheathing bracts high up on the stem: spike long, about 1.5 cm. thick: bracts often as long as the flowers: perianth whitish; lateral sepals free, acutish; petals obtuse: lip rhombic ovate, 6 mm. long, obtuse, surpassed by the sepals and perianth, slightly crisped near the apex: callosities stout, slightly curved, pubescent at the base.

On damp prairies, Louisiana and Texas. June.

Gyrostachys Reverchonii is the Texan homologue of *Gyrostachys brevifolia*. The two species are related by the rhombic-ovate lip which is common to both. The Texan species is more robust than *Gyrostachys brevifolia* and its stem is more leafy. The following specimens should be referred here:

Texas: Prairies, Lancaster, Dallas County, June, *Reverchon* [Curtiss, N. A. Plants, no. 2788*].

Louisiana: Damp places, May. *Hale.*

GYROSTACHYS TRILOBA.

Perennial from several cord-like roots. Stems erect, 3–5 dm. tall, slender, sometimes rather weak: leaves mainly near the base of the stem, these oblong or elliptic-oblong, 3–8 cm. long, acute, sheathing at the base, upper stem-leaves reduced to sheathing scales: spikes 4–8 cm. long, about 1.5 cm. thick: bracts lanceolate acuminate, shorter than the flowers: lip oblong, 6 mm. long, about equaling the sepals and petals in length, recurved and 3-lobed at the tip, crisped throughout, cordate with 2 basal callosities.

In sand, Fort Meyer, Florida. Winter.

The species here described bears but little resemblance to any

of its relatives, differing considerably in aspect by the oblong or elliptic-oblong leaf-blades. However, the crucial character that separates it from all of its relatives is the three-lobed lip. The original specimens were collected by Mr. J. H. Simpson, at Fort Meyer, Florida, December 11, 1891, no. 368.

OXALIS HIRSUTICAULIS.

Perennial from horizontal rootstock, bright green. Stems erect, 1–2 dm. tall, simple or nearly so, stout, densely hirsute, scaly at base: leaves rather numerous; petioles usually 4–10 cm. long, villous-hirsute: leaflets 3, strigillose or glabrate in age, 1–1.5 cm. long, sharply notched, thickish; peduncles erect or nearly so, surpassing the subtending leaves, pubescent like the petioles, topped by umbel-like cymes: pedicels usually 2, 1.5–2 cm. long, subtended by narrow bracts: sepals 5–6 mm. long, various; outer oblong, inner linear-oblong, all ciliate, thin, obtuse: petals golden yellow, 1.5–2 cm. long, glabrous throughout: filaments pubescent: styles villous-hirsute: capsules columnar, about 1 cm. long: seeds 1.5 mm. long, with low, transverse ridges.

In open woods, near Nashville, Tennessee.

For several years I have hesitated to publish this excellent species although to thrust it into any of the species to which it is related does violence to the clear lines separating those species from one another. On the one hand it is related to *Oxalis macrantha*, but differs in its upright habit and the copious spreading pubescence, on the other hand it can be compared with *Oxalis recurva*, but it is very much more robust, its pubescence is of a hirsute type rather than villous, then, too, the inflorescence does not conspicuously surpass the leaves and the styles are not recurved in the characteristic manner in which those of *Oxalis recurva* are.

The original specimens were collected by Dr. A. Gattinger in the vicinity of Nashville, Tennessee. Besides specimens in the Herbarium of Columbia University I have had the use of ample specimens from the Herbarium of the University of Tennessee, through Professor S. M. Bain.

OXALIS BUSHII.

Perennial by horizontal rootstocks, bright green. Stems erect, 1–2 dm. tall, nearly simple, pubescent with spreading hairs: leaves

few; petioles slender, pubescent near their bases like the stem; leaflets 3, 1–1.5 cm. long, sharply notched, strigose or glabrate: peduncles slender, nearly erect, solitary or usually so, overtopping the leaves, glabrous except near the base, topped by umbel-like cymes in which 1 or 2 flowers mature at a time; these accompanied by several drooping buds: pedicels appressed pubescent: sepals oblong, 3.5–4 mm. long, obtuse, ciliolate: petals light yellow, 8–10 mm. long, emarginate or rounded at the apex: filaments much dilated at the base: styles slightly pubescent: capsules not seen.

In dry soil, Missouri and Arkansas. Spring and summer.

As in the case of *Oxalis hirsuticaulis*, I have hesitated several years before publishing the above described species in the hope that some other solution of the problem of its disposal might present itself. The species is so distinct that it is impossible to include it under any species thus far described. *Oxalis recurva* is its nearest relative and it somewhat resembles that species in its young stage, but it is much more fleshy and the stems are not tufted on the rootstocks. The short obtuse sepals and the pale yellow corollas form quite a contrast with the fully thrice larger golden-yellow corollas of *Oxalis recurva*.

The original specimens were collected by Mr. B. F. Bush in Jackson County, Missouri, June 28, 1893, no. 30.

OXALIS PRICEAE.

Perennial from slender creeping rootstocks. Upper part of the stem, petioles, peduncles and pedicels pubescent with very delicate spreading hairs. Stems erect, soon becoming decumbent, 1–3 dm. long, wire-like, more or less branched: leaflets 3, digitate, obcordate, deep green above, pale or glaucescent beneath, 6–9 mm. long, ciliate: peduncles slightly longer than the petioles or shorter, pedicels about as long as the corolla, deflexed at maturity: sepals linear or nearly so, 7 mm. long, pubescent at the base and the tip: petals deep yellow chrome, about 1.5 cm. long, finely pubescent without, ciliate, rounded or truncate at the apex: styles (in plants examined) 6–7 mm. long, densely villous: capsule columnar, 10–15 mm. long.

In open woods, middle Kentucky. Summer and fall.

A remarkable species related to *Oxalis recurva* and *Oxalis macracantha*. It resembles the latter species in habit and in the color of the foliage, and like it, the inflorescence is not elevated

above the leaves, but the pubescence is spreading. The pubescence is similar to that of *Oxalis recurva* but much more delicate, the flowers too resemble those of that species in aspect, but the styles are erect. The most peculiar character is the pubescent and strongly ciliate petals. I do not know that this character exists in any of our many yellow-flowered species. Miss Sadie F. Price, for whom this *Oxalis* is named, has furnished me with copious material from near Bowling Green where she has observed this and other interesting species in the field for several years.

PHYSOSTEGIA DIGITALIS.

Perennial, glabrous below the inflorescence. Stems erect, 7–12 dm. tall, stout, sharply 4-angled: leaves opposite; blades leathery oblong to elliptic-oblong, 10–22 cm. long, acute or acutish at the apex, undulate or repand-serrate above the middle, sessile and partly clasping at the base: racemes simple or branched, finely pubescent: bracts lanceolate or ovate-lanceolate, 4–6 mm. long: pedicels very short: calices 8–10 mm. long; tubes turbinate or cylindric-turbinate; segments lanceolate, acuminate, about one half as long as the tube: corollas barely puberulent along the back, 2–2.5 cm. long; tube rather abruptly dilated into the throat; lower lip spreading, lobes oblong, middle one emarginate, about twice as large as the lateral ones; upper lip slightly undulate.

In low grounds, Louisiana. Summer and fall.

Few specimens of this species have reached our herbaria. The plants are more robust than those of *Physostegia Virginiana* and the large broad entire or merely repand-toothed leaf-blades form a conspicuous contrast with those of the common species. A comparison of the flowers of the two species under consideration shows the calyx of the newly described one to be larger and the corolla smaller than the corresponding members in *Physostegia Virginiana*. The original specimens were collected many years ago in Louisiana. The one was gathered on prairies by Mr. Carpenter while the other is from Alexandria, collected by Dr. Hale.

EUPHORBIA OLIVACEA.

Perennial, olive green, glabrous. Stems solitary or several together, 2–7 dm. tall, simple or branched at the base; branches erect or ascending, forking above or topped by a 4-rayed umbel; leaves alternate below the umbel; blades leathery, oblong, obo-

vate-oblong or cuneate, 1–3 cm. long, obtuse or notched at the apex, with a stout midrib, sessile or short-petioled: involucres scattered along the slender branchlets, campanulate, with a truncate base about 1 mm. high, angled at maturity: glands transversely oblong, about 0.5 mm. broad; appendages ascending, white, 1 mm. long, orbicular-cuneate, minutely erose at the top.

In sandy soil, southern Mississippi. Summer.

Related to *Euphorbia apocynifolia* but the foliage is perfectly glabrous and the stems very rigid. The plants are conspicuous on account of the numerous leaves on the stem and the many small thick broad bracts scattered on the elongated branches of the inflorescence. A good character is furnished by the involucres; these are truncate at the base. I am not aware that this character exists in any other member of the group. The original specimens were collected by Prof. S. M. Tracy at Biloxi, Mississippi on July 15, 1894, nos. 2883 and 2885.

EUPHORBIA ERIOGONOIDES.

Perennial, deep green, glabrous. Stems several or many together, 1–3 dm. long, diffusely branched into a rounded head 1–3 dm. in diameter; branches very slender, zigzag, widely dichotomous, ultimate divisions nearly filiform: leaves opposite, above first fork, reflexed or deflexed; blades linear or linear spatulate, .5–1.5 cm. long, obtuse or acutish, entire, barely petioled: peduncles filiform, 3–8 mm. long at maturity: involucres campanulate with a rounded base, less than 1 mm. high, erect or ascending: glands reniform, about 0.5 mm. broad; appendages ascending, reniform-cuneate, white or pink, about 1 mm. broad, 0.5 mm. long, longer than the gland, some truncate, some cleft: capsules not seen.

In loose sand, eastern Georgia. Spring and summer.

A very characteristic species on account of its close resemblance to *Eriogonum cernuum* and some of its relatives. The stems are diffusely branched from the base and the branches thence widely dichotomous. The leaves at the nodes are reflexed or deflexed and often curved. The very numerous involucres are less than 1 mm. high, while the white or pink appendages are only about 0.5 mm. long and about 1 mm. broad. The small size of the members of the inflorescence and the characteristic habit separate it from all other species of *Tithymalopsis*. The original specimens were collected by the writer in the sands about Darien Junction, in eastern Georgia, June 25–27, 1895.

EUPHORBIA ZINNIIFLORA.

Perennial, dark green. Stems usually solitary, erect, 3–5 dm. tall, with a few ascending branches below the 3-rayed umbel, pubescent with short scattered hairs: leaves alternate except those subtending the umbel; blades narrowly linear-lanceolate, or nearly linear, 2–5 cm. long, mostly reflexed or deflexed, acute or rather obtuse, sparingly pubescent above or glabrate beneath, somewhat revolute, nearly sessile or with somewhat hairy petioles less than 1 mm. long: peduncles slender, erect, 1–3.5 cm. long, angled especially above: involucres campanulate, 1.5–2 mm. high, angled: glands oblong-reniform, fully 1 mm. broad; appendages spreading, white or pink, suborbicular or 4-sided, 3–3.5 mm. long, barely as broad, rounded or emarginate at the apex.

In sandy soil, Yellow River valley, Georgia. Spring.

While collecting in the Yellow River valley in middle Georgia during the spring of 1895, I encountered a curious looking *Euphorbia*, growing in the sands of the river swamp. The habit of the species is peculiar, the few branches of the main stem and the rays of the main umbel are terminated by several-rayed-umbels with narrow spreading leaf-life bracts. The rays of these ultimate umbels are filiform, or nearly so, and characteristically elongated. The leaves are conspicuous on account of their reflexed or deflexed position. As compared with *Euphorbia eriogonoides*, the involucres of this species are very large, sometimes measuring one centimeter across the appendages and closely resemble in aspect the heads of species of *Zinnia*. The body of the involucre differs from that of most other, if not all members of the subgenus *Tithymalopsis* in being broader than high.

EUPHORBIA PERGAMENA.

Biennial or perennial, glaucescent. Stems branched at the base; branches slender, wire-like, 0.5–1.5 dm. long, glabrous or nearly so, forking; leaves opposite; blades parchment-like, oblong or ovate, very oblique, 3–6 mm. long, obtuse, serrulate, minutely pubescent on both sides, conspicuously inequilateral, cordate or subcordate at the base, short-petioled: involucres campanulate, 1–5 mm. high, minutely pubescent, with a split on one side through which the pedicel protrudes: glands transversely oblong, purple or red-purple, variable in size, about 0.5 mm. broad; appendages white or pink, as long as the glands or longer, one much longer than the others, more or less uneven along the edges: capsules

about 1 mm. high, minutely pubescent: seeds less than 1 mm. long, faces transversely wrinkled.

In sand, peninsular Florida.

The specimens on which the above described species is founded were collected in peninsular Florida by both Dr. Garber and Mr. Simpson, and were both distributed under the name of a species to which they are rather remotely related and bear but slight resemblance. The nearest relative seems to be *Euphorbia prostrata*. The newly described species can easily be distinguished by the much stouter root and more numerous and wiry branches. The leaves are conspicuously parchment-like and not fleshy; in short, the plants belonging here have a dry and rigid texture as compared with the fleshy and flaccid herbage of their relatives.

The following specimens are referred here; Florida: Miami, November, 1878, *Garber;* Lemon City, March 2, 1892, *Simpson*, no. 523.

HYPERICUM APOCYNIFOLIUM.

A branching shrub 4–7 dm. tall with a red somewhat shreddy bark. Branchlets narrowly 4-winged: leaves bright green; blades oblong or slightly broadest near the middle, 2–4 cm. long, rounded or emarginate at the apex, rarely revolute, pale beneath, minutely punctate, more or less cuneate at the base, nearly sessile: flowers 3–5 in terminal cymes: sepals spatulate, elliptic or oval, 3–5 mm. long, fully one half as long as the petals, obtuse or acutish, persistent: petals yellow, oblong, 8–9 mm. long: capsules oblong-conic, 12–13 mm. long, acute: seeds cylindrical or slightly constricted about the middle, barely 2 mm. long, minutely but conspicuously reticulated.

In swamps, Arkansas and Texas. Summer.

Probably most if not all of the Texano-Arkansas *Hypericum nudiflorum* may belong to the above descriped species. *Hypericum apocynifolium* is related to *Hypericum nudiflorum* but it is rigidly distinct. The best diagnostic characters are to be found in the flowers, these are somewhat larger than those of the eastern relative. The sepals are fully one half as long as the petals, while the capsules are 12–13 mm. long, being of a narrower pattern and fully twice as large as those of the species with which it has been confused. My attention has recently been recalled to this species by specimens collected near Texarkana during the closing season.

The species was also collected in Arkansas many years ago by Dr. Leavenworth.

GAURA FILIFORMIS.

Perennial, finely canescent. Stems erect or ascending, 1–2.5 m. tall, widely and often diffusely branched above; branches very slender, sometimes nearly filiform: leaves numerous but not conspicuously so; blades linear to narrowly linear lanceolate, 2–10 cm. long, or shorter on the branches, acute or acuminate, rather sharply but remotely serrate or entire towards the inflorescence: spikes elongated and interrupted: calyx puberulent; tube 7–8 mm. long; segments longer than the tube: petals pink-purple, oblong with a narrowed base, about 7 mm. long, obtuse: filaments 5–6 mm. long: anthers 4 mm. high: style surpassing the filaments: fruit narrowly elliptic, 6 mm. long, sessile, canescent, faces slightly ridged.

In sandy banks, Arkansas and Louisiana. Summer and fall.

Related to *Gaura angustifolia*, but very much larger, commonly reaching a height of two and one half meters and copiously and diffusely branched throughout. The narrower acuminate almost entire leaf-blades, the closer pubescence, the pink-purple corollas and the smaller fruit all serve to separate the newly described species from *Gaura angustifolia*.

The specimens on which the species is based were collected by Mr. A. A. Heller, near Texarkana, Miller County, Arkansas, August, 1898, no. 4138. The species is also represented in the Herbarium of Columbia University by a specimen collected many years ago in Louisiana, the label accompanying the specimen contains the following record: "Prairies. Fel[iciana] and Op-[elousas]. Sept. 5th. Wm. C[arpenter].

VERBENA HALEI.

Annual, slender. Stems erect, 2–9 dm. tall, 4-angled, glabrous or strigillose above, branching near the top or rarely at the base: leaves strigillose, 3–10 cm. long; blades various, those of the basal and lower stem leaves oblong to ovate, irregularly toothed and incised, long-petioled, those of middle part of stem commonly broader, 1–2-pinnatifid, shorter petioled: upper ones sparingly toothed or entire: spikes slender; bracts shorter than the calyx, appressed: calyx becoming 3–3.5 mm. long, strigillose; teeth mucronate: corolla blue; tube about 3 mm. long; limb 6–7 mm. broad, segments notched: nutlets linear-oblong, about 2.5 mm. long.

In sandy soil, Indian Territory to Louisiana and Texas. Spring and summer.

Verbena Halei has the general habits of *Verbena officinalis* but differs from that species in both the leaves and inflorescence. The lower leaf-blades are usually less deeply lobed, often merely coarsely toothed, while the upper leaves or leaf-segments are conspicuously elongated and nearly entire or remotely toothed. The corollas are twice the size of those of *Verbena officinalis* and the narrow fruit often fully twice the length of that of the eastern relative. The following specimens belong here:

Louisiana: *Dr. Hale*, no. 245.

Texas: San Diego, 1885–86, *Miss Croft*, no. 119; Corpus Christi, 1894, *Mr. Heller*, no. 1419.

Indian Territory: Between Fort Cobb and Fort Arbuckle, 1868, *Dr. Palmer*, no. 242.

GERARDIA POLYPHYLLA.

Annual, smooth and glabrous or nearly so. Stems erect, 1–4 dm. tall, bushy; branches wire-like, ascending: leaves opposite, numerous; blades linear filiform or setaceous, 1–2.5 cm. long, acute, straight or somewhat curved, slightly revolute: pedicels filiform, spreading, 1–2 cm. long, surpassed by the leaves: calices 2–3 mm.; tubes turbinate; teeth triangular-subulate, one fourth as long as tube: corollas pink or pink-purple, less than 1 cm. long.

In sandy soil, Little Stone Mountain, Georgia. Summer and fall.

The species of *Gerardia* just described is related to *Gerardia setacea* Walt., but it is more delicate and all its members are smaller. All the plants that I have seen are conspicuously much branched and the small corollas and the large calyx-teeth which are fully one fourth as long as the turbinate tube easily separate the species from any forms of *Gerardia setacea* with which I am acquainted.

The original specimens were collected by the writer on Little Stone Mountain, DeKalb County, Georgia, in September, 1895. Specimens which without much doubt will have to be referred here have now been brought in by Mr. Heller from the vicinity of Texarkana, Arkansas, no. 4219. These are almost identical with the Georgia plants.

GERARDIA VIRIDIS.

Annual, slightly scabrous, drying green. Stems erect, 2–6 dm. tall, branching, sharply angled: leaves opposite or slightly scattered; blades narrowly linear, 1–2 cm. long, acute, revolute, scabrous along the edges, sessile or nearly so: pedicels ascending, 8–15 mm. long, as long as the leaves or shorter, slender: calices 4–5 mm. high; tubes turbinate to turbinate-campanulate; teeth acute, about one third as long as the tubes: corollas yellowish-pink, less than 1 cm. long; segments ciliate, truncate or barely emarginate.

In sandy soil, Arkansas to Louisiana. Summer and fall.

At least two species in addition to the type are passing under the name *Gerardia Skinneriana*. The one I have just separated in the above description can be easily recognized by the coarser habit, the larger and broader leaves and the long calyx-teeth; these form a strong contrast with the minute teeth of the calyx of *Gerardia Skinneriana*. Mr. Heller has collected excellent specimens of the species about Texarkana, Arkansas, during the past season, no. 4240. Dr. Hale found it many years a little further south at Alexandria, Louisiana.

SOLIDAGO HELLERI.

Perennial, robust. Foliage nearly glabrous: stems erect, 6–16 dm. tall, usually green mottled with purple, branched above into wide spreading panicles: leaves numerous; blades narrowly elliptic or oblong-elliptic, 3–10 cm. long, acute, serrate with appressed teeth at least above the middle, smooth and glabrous above, sparingly pubescent beneath, ciliate, sessile or nearly so above: racemes one-sided, slightly recurved; bracts linear or linear-spatulate: involucres cylindric, about 6 mm. high, spirally twisted; bracts glabrous, erect, firm, leathery, linear or linear-lanceolate, conspicuously decurrent on the peduncle: rays 2–4, yellow, inconspicuous, partly included; blades oblong, 1–1.5 mm. long.

In sandy woods, Arkansas.

Solidago Helleri is related to *Solidago rugosa* and *Solidaga ulmifolia*, possessing the general habit of the former and in the foliage characters nearest to the latter. It differs from both relatives in its peculiar heads; these members are supported on slender peduncles, which are often copiously furnished with delicate bracts. These bracts grade into those of the involucre proper, and, like

those of the involucre, are strongly spirally arranged, giving a conspicuous twist to the heads.

The plants on which the species is founded were collected by Mr. A. A. Heller, near Texarkana, Bowie County, Texas, September, 1898, no. 4188.

DOELLINGERIA SERICOCARPOIDES.

Perennial, deep green. Stem erect, 8–12 dm. tall, corymbosely branched above, finely ridged, purple or purple-mottled, glabrous to the ultimate divisions or near them; leaves numerous; blades firm, elliptic to lanceolate-elliptic, acute or slightly acuminate at the apex, somewhat scabrous above, glabrous and paler beneath or minutely pubescent on the nerves beneath, ciliate, narrowed into short petioles or nearly sessile: peduncles minutely pubescent: involucres cylindric-campanulate, about 4 mm. high, 2–2.5 mm. thick; bracts very sparingly pubescent, outer linear-lanceolate, inner linear, ciliate at the tip: rays white, 2–4, oblong, 5–6 mm. long: mature heads about 8 mm. high: achenes almost glabrous.

In low grounds, Arkansas and Texas. Fall.

The *Doellingeria* inhabiting the lower Mississippi valley is undoubtedly specifically distinct from all the recognized species. It was separated from related forms in Torrey and Gray's Flora of North America and recognized as a species by Schultz Bipontinus in the Meisner Herbarium. However, as far as I can learn, it has never been given a name. From the other species of the genus it may be distinguished by the more rigid habit and the firmer texture of the leaves, but the most characteristic distinction lies in the inflorescence; this is quite suggestive of the species of *Sericocarpus* in the ultimate clusters, but the branches of the inflorescence are conspicuously elongated. The small heads which are only about half the size of those of its relatives furnish a crucial character. The original specimens were collected by Mr. A. A. Heller, near Texarkana, Miller County, Arkansas, in August and September, 1898, no. 4137.

ASTER CONTINUUS.

Perennial, deep green. Stems erect, pubescent with short upcurved hairs, simple below, much branched above, slightly flexuous: leaves spreading; blades 2–4 cm. long, somewhat fiddle-shaped, acute, shallowly serrate or nearly entire, ciliolate, scabro-pubescent

on both sides, sessile, clasping at the base: inflorescence ample; branches spreading, slender, closely pubescent, furnished with many approximate bract-like scales: heads showy: involucres turbinate, short before anthesis, elongated to 1 or 1.5 cm. at maturity: bracts numerous, linear or nearly so, acute, erect or slightly spreading, with narrow dark green tips, conspicuously decurrent on the peduncles: rays 12–15, violet, nearly linear, about 1 cm. long: achenes pubescent.

In dry soil, Arkansas. Fall.

Aster continuus is one of the more conspicuous species of the genus. Its relationship is with *Aster patens*. Differences in habit and foliage are much subornate to the very peculiar involucres. Up to about the time the rays expand these members are turbinate, but after the rays expand and the head matures the involucres become conspicuously obconic and greatly elongate. The bracts of the involucre have often a conspicuously spiral arrangement and gradually pass into those of the elongated peduncles. The original specimens were gathered by Mr. A. A. Heller, near Texarkana, Arkansas, in September, 1898, no. 4283.

III. THE PARONYCHIACEOUS GENUS FORCIPELLA.

Unfortunately the name FORCIPELLA which I lately associated with a genus of PARONYCHIACEAE was used in the family ACANTHACEAE* since the publication of the Kew Index and before my adoption of it. This being the case, I cannot do better than associate the name of the late Professor Lewis R. Gibbes, of Charleston, South Carolina, the discoverer of such conspicuous species as *Aster mirabilis* and *Tsuga Caroliniana*, and founder of an important herbarium,† with this interesting genus:

GIBBESIA.

GIBBESIA RUGELII (Chapm.).

Siphonychia Rugelii Chapm. Fl. S. States 47. 1860.

Paronychia Rugelii Shuttl.; Chapm. Fl. S. States 47. As synonym. 1860.

Forcipella Rugelii Small, Bull. Torr. Club, **25**: 150. 1898.

* See Engler and Prantl, Nat. Pfl. Fam. **4**: Abh. 3, b. 343.

† This herbarium is now incorporated in the herbarium of the New York Botanical Garden.

Exposure and fungous Diseases.*

By Byron D. Halsted.

Exposure has something to do with the attack of parasitic fungi and this may be of at least two kinds—to the elements—sunshine, air, moisture, etc., and to the germs of the disease. Both of these sets of conditions work together for the production of infection.

Some striking illustrations of the value of exposure to the germs in the success of inoculation have come under the writer's notice within the past year. Attention is directed to the infestation of a young growth of asparagus to the rust fungus, *Puccinia asparagi* DC. On September sixth, while inspecting asparagus fields in Gloucester county, New Jersey, the writer came to a field with quite an unusual green appearance, nearly all the fields being brown and lifeless so far as the brush was concerned, having been killed by the remarkable ravages of the rust fungus. The field in question had been cut over and the very rusty brush removed about five weeks before, with the hope that the new growth might escape the ravages of the *Puccinia*. At the date of the inspection the brush was about hip high and showing the rust only upon one side of each plant. So strikingly one-sided was the output of the rust sori that one could scarcely fail to observe it. Every main stem was almost completely covered with the rust upon one side, while the opposite bore almost no spots. It was also noticed that this rusted side varied somewhat at different ends of the long field, and at all points was at right angles to lines drawn from an old and very badly rusted bed of asparagus that stood with its end towards the broad side of the field in question and about forty rods away.

This observation teaches something concerning the rapidity of the development of the rust fungus. As the brush must needs have been developed to some extent before the uredospores could have alighted upon them, and as also it is fair to judge that many

*Prepared for the Botanical Club of the A. A. A. S., Boston, Mass.

of the sori upon the plants were fully ten days old, therefore not more than two weeks might have elapsed from the time when the spores came to the asparagus plants to that when sori were giving off their spores. The season was unusual, July being a very rainy month, and the long wet period continued into August, followed by hot moist weather particularly favorable for the development of fungi.

That the source of infection was the old asparagus bed is beyond question. About midway between the two beds stands a house and a few trees around it, and it was observed that there was less rust upon that portion of the new bed that was in line with this house and the old bed. In short, there was a barrier between the old bed and the new that interfered with the free passage of the spores. When the surface of the rusted stems of the old bed were dry and the winds blew from it towards the new bed, the spores were doubtless carried in great abundance, and these spores alighting upon the tender stems of the young shoots, encouraged by hot dewy nights, quickly germinated and rusted the plants. There is no reason to doubt that some of the rust spores were carried by the winds to long distances and infected plants miles from where they were produced.

A single other instance may be mentioned in passing that appears to have escaped previous observation. The hollyhock rust (*Puccinia malvacearum* Mont.) is very abundant in some gardens in New Jersey. The normal place for the production of the sori of this rust is upon the under surface of the leaf blades, but in very badly infested plants the veins and petioles of the leaves and even the stem of the hollyhock bear the rust spots. The point of observation is this, that when the petioles are rusted the disease is confined almost entirely to the upper side.

It is possible that here there may be a working together of the exposure to the germs and the favorable meteorological conditions for the development of the spores.

As in the asparagus rust the infection is rapid, but here it is by means of sporidia and not by uredospores as in the *Puccinia asparagi*. These sporidia are borne abundantly by the leaves above and might naturally drop upon the upper surface of the petioles, the hairiness of which would tend to hold them. It is possible

that the warmth of the spring sun upon the moist upper surface furnishes the conditions that favor the growth of the sporids.

An examination of the stems, some of which were badly rusted, showed that the side towards the center of the group of stalks were the most affected.

This leads naturally to a study that was made of bacteriosis in beans briefly mentioned with an engraving in Mycological Notes in the June issue of the BULLETIN.

"The rows ran nearly north and south and upon the east side of the plants there was but a small amount of the bacteriosis (*Bacillus phaseoli* Sm.) to be seen, while upon the west side nearly every pod of the green flageolet variety was more or less blotched, many of them literally covered with the bacterial ulcers, which were in many instances of an amber color, due to the multitude of the germs of the bacillus that had collected in a layer upon the surface."

Fully nine tenths of all the blotches were upon the western sides of the pods and about two fifths of all the pods of the variety in question were badly affected.

Strong winds upon the 17th and 20th of September bent the plants to the southeast, from which they did not fully recover. As a result, at the time the above observations were made, October 5th, the plants all leaned several degrees from the perpendicular and some of the pods were likewise tilted. In short, the foliage of the plants hung chiefly upon the eastern side of the row and had done so for between two and three weeks, and therefore one side of each pod was more exposed than the other, and that exposure was, speaking generally, in the direction of the four o'clock sun.

It had been previously observed that the leaves of the plants under consideration were badly blighted for weeks before the pods became noticeably injured, and it is not unlikely that the germs were carried from the diseased leaves to the pods by the dripping dews, in which case the side that was slightly inclined upward on account of the slanting posture of the plants would receive a more generous supply of the germs than the more protected underside.

It is possible that the bending of the plants so exposed the pods that they became more or less injured by the sun and thus provided more favorable conditions for the development of the

bacteria. The warmth of the sunny side may have been sufficient to make the difference observed.

All the circumstances may have combined to bring about the results that were so strikingly evident. The bending of the plants and the swinging of the foliage to the eastward, the inclining of the pods and the exposing of the upper surface, that would naturally receive the drips from the diseased leaves, the autumn sun during the afternoon, either adding the required warmth for the germs or partially scalding the side most exposed and thus render the tissues more susceptible to attack are all still open questions.

One cannot but wonder what the result might have been had the plants been pressed back into place after the storm or a portion of the plot been shaded or even if the rows had run east and west instead of north and south.

If spores pass through the air, as is the common belief, there is nothing particularly obscure in the observations in the asparagus field, and the hollyhock rust upon the upper side of the petiole is only an instance of the drips from an infested leaf naturally reaching the nearest side, while the bacteriosis of the bean deals with the unequal conditions for growth upon different sides of the bean pod due to more favorable ones obtaining upon the one than the other. Doubtless many other instances like the ones cited may be found when one is upon the watch for them.

RUTGERS COLLEGE.

New and interesting Plants from Western North America.—IV.

By A. A. Heller.

FENDLERELLA gen. nov.

[Fendlera § Fendlerella Greene, Bull. Torr. Bot. Club, **8**: 26. 1881.]

Low, cymosely much branched shrubs, with small, opposite, or subverticillate leaves, narrowed at the base, and sparingly appressed pubescent: the slender branches terminated by compound cymes, which bear small, white flowers, these five-merous: calyx cylindrical turbinate, pubescent, its lobes oblong: petals oblong, unguiculate: capsule oblong, affixed to the calyx-tube for half its length: cells one-seeded.

Fendlerella Utahensis (Wats.)

Whipplea Utahensis Wats. Amer. Naturalist **7**: 300. 1873.

Fendlera Utahensis Greene, Bull. Torr. Bot. Club, **8**: 26. 1881.

Originally collected by Mrs. E. P. Thompson, at Kanab, in Southern Utah, "on dry rocky cliffs; July, August." That this plant is not a *Whipplea* is evident, neither does it agree much better with the genus *Fendlera*, with its large usually solitary flowers, tetramerous, and its ovoid capsule, which is attached to the calyx-tube only at the base. At first sight, dried specimens suggest *Ceanothus Fendleri*. Good specimens were collected by Dr. D. T. MacDougal in the Grand Cañon of the Colorado, Arizona, June 26, 1898, no. 158.

Inadvertently the wrong authority was cited in my treatment of a species of *Opulaster* on page 581 of this volume. The citation should read as follows:

Opulaster pauciflorus (T. & G.)

Spiraea opulifolia, γ pauciflora T. & G. Fl. N. A. **1**: 414. 1840.

Spiraea pauciflora Nutt. MSS.; T. & G. Fl. N. A. **1**: 414. 1840.

Neillia malvacea Greene, Pittonia, **2**: 30. 1889.

This species was also collected by Douglas at the "Kettle Falls," now known as Spokane Falls, but his specimens, as well as Nuttall's original, were referred to *O. monogynus*, a species inhabiting the middle and southern Rocky mountain region.

LINUM AUSTRALE sp. nov.

Annual (?), usually somewhat corymbosely branched from the base, 2–3 dm. high, the stem ascending, glaucous, puberulent, angled, especially in the upper half, leafy throughout; leaves narrowly linear, .5–1.5 cm. long, 1 mm. wide, one-nerved, more or less glandular ciliate, especially the upper ones: sepals linear-lanceolate, about 5 mm. long, one-nerved or keeled, light colored at the base, greenish above, glandular ciliate, awn-pointed: petals pale yellow throughout, little longer than the calyx: capsule ovoid, between 3 and 4 mm. long, somewhat obtuse.

Our no. 3724, first collected on an open slope in dry ground, at the head of the reservoir, four miles east of Santa Fé, New Mexico, June 17, 1897, altitude 7,500 feet. Later it was obtained eleven miles southeast of Santa Fé, along the road leading to Cañoncito. At this second station it grew on dry slopes which were sparsely clothed with pine trees. The type is in the herbarium of the New York Botanical Garden.

Only two species of *Linum* were observed in the vicinity of Santa Fé, this species and *Linum puberulum* (Engelm.) Heller, but the latter was seen only on the lower ground to the north and west of the town.

To *Linum australe* belong Prof. E. O. Wooton's no. 592, collected in the White mountains, Lincoln County, New Mexico, July 30, 1897, altitude 6,800 feet, as well as Dr. D. T. MacDougal's no. 379, collected August 4, 1898, on the slopes of Mt. San Francisco, near Flagstaff, Arizona.

GALIUM WATSONI (A. Gray)

Galium multiflorum, var. *Watsoni* A. Gray, Syn. Fl. N. A. 1[2]: 40. 1884.

Described as "mostly glabrous and smooth; leaves thinner, oblong-lanceolate (commonly about half an inch long and 2 lines wide), with lateral nerves either distinct or obsolete.—*G. multiflorum* Watson, l. c. (Bot. King Exped. 135) in great part." From descrip-

tion, the type of this would be no. 484, collected on the Wahsatch mountains, Utah, August, 1869, altitude 8000 feet. But on the same sheet in the Columbia University Herbarium, and under the same number, 484, are two other specimens, which are not of this species. One was collected on the Wahsatch mountains, Utah, July, 1869, and the other on the East Humboldt mountains, Nevada. These have shorter, rounder, pubescent leaves.

Specimens of *G. Watsoni* were collected on the slopes of the Grand Cañon of the Colorado, Arizona, by Dr. D. T. MacDougal, June 26, 1898, no. 157.

ERIGERON TETRAPLEURUS (A. Gray)

Erigeron stenophyllum, var. *tetrapleurum* A. Gray, Proc. Am. Acad. **8**: 650. 1873.

Erigeron Utahensis A. Gray, Proc. Am. Acad. **16**: 89. 1880.

Specimens which appear to belong with this species, were collected by Dr. D. T. MacDougal, in the Grand Cañon of the Colorado, Arizona, June 28, 1898, no. 188. Why Dr. Gray changed the name of this plant when he raised it to specific rank, is not apparent, as the varietal name seems to be perfectly valid. While looking up the original description and synonomy of this plant, I discovered that two other species bear names which are untenable:

ERIGERON GRAYI nom. nov.

Erigeron stenophyllus A. Gray, Pac. R. R. Surv. (Whipple Expedition) **4**: 98. 1857. Not *Erigeron stenophyllus* H. & A. 1836, nor *Erigeron stenophyllus* Nutt. 1847.

The type of this was collected "on hillsides and steep banks of the Pecos; October," by Dr. J. M. Bigelow. The particular place meant is the ford of the Pecos in New Mexico, on the Santa Fé trail, not far from where the Santa Fé railroad now crosses the stream.

ERIGERON NUTTALLII nom. nov.

Erigeron stenophyllus Nutt. Journ. Acad. Phila. (II) **1**: 176. 1847. Not *Erigeron stenophyllus* H. & A. 1836.

Erigeron foliosum var. *stenophyllum* A. Gray, Bot. Cal. **1**: 330. 1876.

MACDOUGALIA gen. nov.

Perennial herbs, the stems from a multicipital caudex, usually simple, covered with floccose tomentum when young : leaves narrow, mostly basal, neither impressed punctate nor resinous atomiferous : heads solitary, large, radiate ; involucre hemispherical, its bracts in two rows, all lanceolate, awn-pointed, little shorter than the broad, obtusely conical receptacle, those of the inner series slightly longer and narrower than those of the outer : paleae of the pappus almost as long as the disk flowers, subulate-lanceolate.

This species, formerly included in the genus called *Actinella*, which has recently been well segregated by Professor Greene, appears to me to be worthy of generic rank. In habit it is more like the genus *Tetraneuris*, but has a different involucre, and while its involucre is somewhat similar to that of the genus *Picradenia*, there is a wide difference in habit. The following species is the only one recognized :

MACDOUGALIA BIGELOVII (A. Gray)

Actinella Bigelovii A. Gray, Pl. Wright. **2** : 96. 1853.

The type was collected by Dr. J. M. Bigelow, in 1851, "on mountains near the copper mines, and near the Mimbres, New Mexico, April, June." Dr. D. T. MacDougal's no. 2, collected near Flagstaff, Arizona, May 31, 1898, is referred here for the present, although it may prove distinct.

411 WEST WALNUT STREET, LANCASTER, PA.

Two recently named Genera of Basidiomycetes.

By Lucien M. Underwood.

The publication of the parts of *Die natürlichen Pflanzenfamilien* relating to fungi have presented some phases of ancient practice still in use at Berlin that we supposed belonged only to the earlier ages of plant nomenclature. One of these is so prominent a violation of all canons of nomenclature that we must prctest against it. It consists in widening the scope of a genus already established and then giving an uncalled-for new name to the group thus established.

Kalchbrenner * gave the name *Boletinus* to a group of *Boleti* of which *B. cavipes* Opat. was the type. Later Peck † extended the genus so as to include other forms in which the pores were somewhat radially arranged and whose pore-layer separated with difficulty from the hymenophore. In the last issue of the Basidiomycetes, ‡ Herr Hennings has still further modified the genus so as to include *Boletus cavipes* Opat. which he places in "Sect. III. Boletinus Kalchbr." together with *B. rufus* Schaeff., *B. luteus* L. and other European and American species, and proceeds to baptize the whole combination with the name *Boletopsis* P. Henn. We are amazed that this sort of thing is permitted at a center where strict attention is supposed to be given to correct nomenclature and where specific rules have emanated that have had world-wide notice and criticism. *Boletopsis* P. Henn., is therefore a worse than useless synonym, and *Boletinus* Kalchbr. must stand in its place.

Another error of an earlier issue of the same work, namely the establishment of the genus *Kneiffiella* P. Henn. needs correction and we take the task in hand the more readily because the first oversight of a previous genus of the same name in recent literature here made by Herr Hennings, was made by us nearly a year prior to the date of publication of exactly the same name in *Die*

* Icones sel. Hym. Hung., 52. 1877.

† Bull. N. Y. State Mus. **2**: 74. 1889.

‡ Engler-Prantl. Die natürlichen Pflanzenfamilien, 1***: 194. 1898. This awkward and needlessly complex form of citation for a volume is characteristically clumsy and indicates a lack of attention to detail which editors should never allow.

natürlichen Pflanzenfamilien. Herr Hennings has committed a double error in that he has not only overlooked the original publication of *Kneiffiella* by Karsten, but also its establishment by us in 1897 as a substitute for *Kneiffia* Fr., thus making it appear as a new generic name "*Kneiffiella* P. Henn." an exact equivalent of the generic name we had substituted. Herr Hennings has, however, been careful to galvanize all the species under his new genus, a practice of literary revision always greatly to be deplored and especially unfortunate in this case, as the work will have to be done again.

Since *Kneiffiella* as a substitute for *Kneiffia* Fr. is untenable in the presence of *Kneiffiella* Karst, * which was established for an entirely different plant which has not been included under *Kneiffia* Fr. we shall make another attempt to relieve the difficulty by proposing the following new generic name:

PYCNODON. †

[KNEIFFIA Fr. Epicrisis systematis Mycologici, 529. 1838. Not *Kneiffia* Spach, Hist. Veg. Phan. **4**: 373. 1835 (Epilobiaceae).]

[KNEIFFIELLA Underw. Bull. Torr. Bot. Club, **24**: 205. 24 Ap. 1897.]

[KNEIFFIELLA P. Henn. Die nat. Pflanzenf. **1**^{1**}: 139. 1898. Not *Kneiffiella* Karst. Krit. Ofversigt af Finlands Basidsvampar, 371. 1889.]

The type of Fries' genus was *Thelephora setigera* Fr. Elench. Fung. 208. 1828, which is a synonym of *T. aspera* Pers. Mycol. Europ. **1**: 153 (excl. icon.). 1822. The type species will now be known as *Pycnodon asperum* (Pers.)

* Kritisk Ofversigt af Finlands Basidsvampar, 371. 1889. The genus was monotypic, founded on *Hydnum barba-Jovis* Bull. (*Odontia barba-Jovis* Fr.).

† From πῦκνός, crowded, and ὀδούς tooth.

New Species of Lichens from Southern California determined by Professor W. Nylander.

By H. E. Hasse.

Lecanora praecrenata Nyl.

Thallus of rugose furfuraceous small distinct rounded squamules or united to larger ones and then rimose, with a rounded lobulate outline of light green clay color: apothecia from one-half to less than one millimeter in diameter; disk flat, black, pruinose, with a permanent crenate white margin: spores 4–6 in asci, globular, 20 in diameter, with finely granular contents. Hym. Gelat. J. + blue, changing to greenish yellow, which color the spores at once assume.

Of the *L. cinerea* group. On disintegrated granite and clay. Barton's Peak, Santa Monica Mountains.

Arthonia pruinosella Nyl.

Thallus effuse, white with a flesh-colored tint when wet, epiphlaeoidal: apothecia small, round, to larger and oblong, elevated, dark brown to black, slightly pruinose, with a thin scaly thalline margin: spores simple and 1–3-septate, oblong, 12–16 μ long, 5–6 μ wide.

On *Cordia* sp.—a Brazilian shrub or tree cultivated at the Agricultural Experiment Station at Santa Monica.

Thelopsis subporinella Nyl.

Thallus indistinct of small pale ochraceous colored globules, between thickly studded concolorous more elevated globular immersed apothecia, forming patches from one-half to one centimeter in diameter, with an irregular outline: epithecium darker, punctiform, depressed: "thecae polysporae, sporis oblongis, 120–140 μ long. 4 μ crass." Simple or 1-septate.

On bark of *Umbellularia Californica*. Malibu Cañon, Santa Monica Mountains. August, 1898.

Lecidea triphragmioides Nyl. sp. nov.

Thallus cartilaginous rugulose, rimose, areolate, ash colored: apothecia numerous, small to medium; disk black, papillate, flat to slightly convex and indistinctly pruinose; margin black, thick,

prominent, crenulate and undulate or angular: hypothecium brown: spores broadly fusiform with acuminate ends, 28 μ long, 8 μ thick: paraphyses thick, adglutinated. "Sporae fuscae J. Gel. Hym. fulvo-rufescens."

On bark of *Rhamnus Californica* along the beach near Santa Monica. August, 1898.

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SUBJECT INDEX

Alabama Biological Survey, Contributions from the, I., 359.
Alabama Fungi, New or noteworthy, 359.
Alabama Fungi, New Species, 368.
A. A. A. S., Boston Meeting, Proceedings of, 551.
Anthocerotaceae of North America, The (Plates 321–326) 1.
Aplectrum. The Mycorhizæ of, 110
Asclepiadaceae, Studies in the, II., III., 30, 171.
Assimilative Tissues in Sporophytes, The Evolution of, 25.
Atriplex, A new, 207, 284.

Bermuda Ferns, Revision of the, 593.
Basidiomycetes, Two recently named Genera of, 630.
Book Reviews, 57.
Botanical Society of America, Proceedings of, 550.
Botrychium, The ternate Species of, 521.

California, New Species of Lichens from Southern, 632.
Canary Islands, A Sketch of the Flora of the, 351.
Characeae, Contributions to Japanese, III., 73.
Chloris and Eustachys in North America, A Revision of the Genera, 432.
Compositae from New Mexico, New (Plates 330–334), 117.
Cordyceps stylophora Berk & Br., in Minnesota, 583
Correction, A, 284.

Douglas Spruce, Pseudotsuga mucronata, On an abnormal cone in the (Plate 327), 90.

Eleocharis melanocarpa, a proliferous Plant (Plate 344), 392.
Eurhynchia, A Revision of the North American, 221.
Eustachys in North America, A Revision of the Genera Chloris and, 432.

Fabroleskea, a new Genus of Mosses, 108.
Ferns, Revision of the Bermuda, 593.
Ferns, American, I., 521.
Fungi from various Localities, New Species of, 501.
Fungi, New or noteworthy Alabama, 359.
Fungi, New Species of Alabama, 368.
Fungi, New Species of, 321.
Fungi, Starch Distribution as affected by, 573.
Fungous Diseases, Exposure and, 622.

Grasses, New or noteworthy American, VIII., 83.
Grasses from Van Cortlandt Park, New York City, Two new (Plates 328, 329), 104.

Heat of Imbibition by Seeds, 272.
Hepaticae, New American (Plates 336, 337), 183.
Hepaticae collected by John B. Hatcher in Southern Patagonia, An Enumeration of the (Plates 345–348), 407.

Index to recent Literature relating to American Botany, 60, 113, 168, 217, 285, 346, 404, 461, 557, 584, 634.
India, Mosses of Northern, 398.
Indian Corn, The Histology of the Embryo of (Plate 342), 311.
Insect-visitors of Flowers, The, 382.

Japanese Characeae, Contributions to, III., 73.

Lichens from Southern California, New Species of, 632.

Maine Plants, Notes on, 210.
Marcy's Report on the Red River of Louisiana, Three Editions of, 155.
Mosses, Fabroleskea, A new Genus of, 108.
Mosses of Northern India, 398.
Mycological Notes.—II., III., 158, 329.
Mycorhizae of Aplectrum, The, 110.

New Mexico, New Plants from, I., II., III., 257, 304, 451.
North American Plants, Notes and Descriptions of, I., 316.

Parasites of the Red Clover, Two phaenogamous, 395.
Piperaceae Bolivianae, 566.
Polygonaceae, Studies in North American, I., 40.
Porella once more, 95.
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Proceedings of the Club, 163, 212, 345, 399, 517.

Red River of Louisiana, Three Editions of Marcy's Report on the, 155.
Rosaceae, Some changes in the Nomenclature of North American, 54.
Rose, A new Southwestern (Plate 335), 152.

Sapindaceae from South America, New Species of, 336.
Saxifraga fallax, Abnormal Inflorescence in (Plate 343), 391.
Seeds, Heat of Imbibition by, 272.
Selaginella rupestris and its Allies, 125.
Sophia, A new Southwestern, 460.
South America, 1885–1886, An Enumeration of the Plants collected by Dr. H. H. Rusby in, XXIV., XXV., 495, 542.
Southeastern United States, Studies in the Botany of the, XIII., XIV., XV., 134, 65, 605.
Southern Plants, Two, 344.
Starch Distribution as affected by Fungi, 573.
Susquehanna, The Flora of the Lower (Plate 349), 485.
Syntherisma in North America, The Genus, 289.

Tendrils, A Contribution to the Physiology of, 65.
Triplasis, Revision of the Genus, 561.
Two new Species, 338.

Utricularia, A new Species of, 515.

Washington Plants, Some rare, II., 208.
Western North America, New and interesting Plants from, I., II., III., IV. (Plates 338–340), 193, 265, 580, 626.
Wyoming, New Plants from, I., II., III., IV., (Plate 341), 202, 275, 373, 546.

GENERIC INDEX

Abies, 91. 345, 501.
Abronia, 155, 209.
Abutilon, 573.
Acanthoscyphus, 53.
Acer, 274, 367, 490, 506, 509, 605.
Acerates, 30, 32, 33, 34, 35, 36, 37, 38, 39, 213.
Acrobolbus, 425.
Acrostichum, 522, 523, 602, 603.
Acrostolia, 410.
Actinella, 629
Adelanthus, 409.
Adelocolea, 409.
Adenocarpus, 356.
Adenocaulon, 511.
Adiantum, 356, 594, 595, 596, 599, 604.
Aecidium, 333, 508.
Agaricus, 325.
Agave, 362.
Agoseris, 124.
Agrimonia, 210.
Agropyron, 211.
Agrostis, 211.
Aira, 209, 563.
Allium, 209. 215, 488.
Allophylus, 336.
Alnus, 506.
Amaranthus, 211, 574.
Amblyanthera, 496.
Amblyostigma, 497.
Amblystegium, 398.
Amphidium, 398
Amphisphaeria, 513.
Anantherix, 30.
Anaphalis, 215.
Androcryphia, 409, 410.
Andropogon, 83, 443, 444.
Androsace, 318, 3 9.
Andryala, 356
Anemia, 522, 523, 524.
Anemone, 208.
Aneura, 410, 411, 412.
Angelica, 375.
Angiopteris, 27, 28.
Anomodon, 398.
Antennaria, 360.
Anthaenantia, 290.
Anthoceros, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 27, 163. 413.
Anthostomella, 360.
Antoiria, 99.
Aphanorhegma, 402, 403.
Aplectrum, 110, 111, 112.
Aplopappus, 376.
Aquilegia, 216, 466.
Arabis, 373, 489.
Aralia, 389.
Arbutus, 357.
Arisaema, 550.
Arisarum. 356.
Aristida, 86.
Arnica, 216, 494.
Artemisia, 209, 455, 502, 504, 507.
Arthonia, 632.
Arundinaria, 360, 361, 362, 363.
Asclepias, 30, 31, 32, 33, 34. 35, 36, 38, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 214, 497.
Ascyrum, 491.
Asimina, 489.
Asparagus, 354.
Asphodelus, 356.
Aspidosperma, 495.
Asplenium. 356, 357, 403, 486, 487, 597, 598, 604.
Aster, 213, 458, 459, 493, 620, 621.
Asterella, 189, 190, 191.
Asteroma, 509.
Astrodochium, 514.
Atriplex, 203, 204, 207, 284, 460.
Auerswaldia, 360.
Aulographum, 365.
Azalea, 491.

Baccharis, 493, 594, 597.
Bahia, 270.
Baptisia, 139, 605.
Baptista, 134.
Barbula, 398.
Bartramia, 398.
Basichiton, 429.
Begonia, 555.
Bellincinia, 99.
Berberis, 304, 306.
Bidens, 481.
Bigelovia, 513.
Blechnum, 522, 523, 603.
Blepharidophyllum, 413.
Blepharodon, 542.
Blepharoneuron, 88.
Blepharostoma, 413, 414, 415,
Boisduvalia, 199, 200.
Boletinus, 630.
Boletopsis, 630.
Boletus, 371, 630.
Boltonia, 493.
Botrychium, 127, 519, 521, 522, 523, 524,

525, 526, 527, 528, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 556.
Botryosphaeria, 360.
Botrypus, 528, 529.
Botrytis, 512.
Bourgeana, 215.
Brachiaria, 291.
Brachythecium, 222, 223, 225, 228, 229, 230, 231, 232, 233, 238, 398.
Brassica, 210.
Brickellia, 118.
Bryanthus, 216.
Bryhnia, 228, 229, 230, 231, 232, 233.
Bryum, 398, 403.
Buddleia, 544.
Bumelia, 212.

Calamagrostis, 511.
Calloria, 507.
Calypso, 193.
Campanula, 209, 215, 358.
Camptosorus, 403.
Cantharellus, 323, 324, 364.
Capnoides, 137.
Cardamine, 489.
Carduus, 123 494.
Carex, 209, 211, 488, 553.
Carpobolus, 20, 21.
Carpolipus, 20.
Carthamus, 335.
Cassia, 508
Cassiopoea, 216.
Castilleja, 268.
Catalpa, 492.
Caulophyllum, 137.
Cavendishia, 98.
Ceanothus, 605, 626.
Cedronella, 358.
Celtis, 608.
Cephalozia, 424.
Ceratodon, 398.
Cercospora, 158, 366, 512.
Chaetaria, 86, 87.
Chaetochlora, 105, 106, 107.
Chaetodiplodia, 510.
Chaetomella, 510.
Chaetomium, 501.
Chamaecrista, 554.
Chamaelirium, 100.
Chara, 164.
Cheilanthes, 356, 487.
Cheiranthus, 489.
Chelonanthus, 545.
Chelone, 383.
Chenopodium, 215.
Chiloscyphus, 183, 415, 421, 422.
Chionanthus, 492.
Chloris, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450.
Chromosporium, 327.
Chrysanthemum, 210, 355.
Chrysogonum, 494.
Chrysopsis, 119, 477, 493.
Chrysothamnus, 377.
Cicuta, 399, 491.
Cinnamum, 609.
Cirriphyllum, 222, 223, 224, 225, 226, 228.
Citrullus, 606.
Clavaria, 326, 371.
Clitocybe, 321, 322.
Coleosanthus, 117, 118.
Commelina, 451, 488.
Comptonia, 554.
Conanthus, 262.
Condylocarpon, 496.
Conradina, 469, 470.
Coprolepa, 501.
Corallina, 550
Corallorhiza, 111, 112.
Cordia, 632.
Cordyceps, 501, 583
Coreopsis, 146, 494.
Cornularia, 511.
Cornus, 386, 387, 388.
Corylus, 504, 580.
Coryneum, 511.
Coutoubea, 545.
Crepidotus, 324.
Crotalaria, 490
Crotonopsis, 606.
Cucurbita, 606.
Cucurbitaria, 512.
Cupania, 337.
Cuscuta, 211, 355, 492.
Cynanchum, 499.
Cyperus, 488.
Cryptogramma, 522.
Cryptosporium, 511.
Cystopus, 575, 577.
Cytisus, 356.

Danaea, 27, 28.
Dasyscypha, 506, 507.
Davallia, 356.
Delphinium, 208.
Dendroceros, 3.
Desfontainia, 544.
Desmatodon, 398.
Dianthera, 492.
Dianthus, 210.
Dicranoweisia, 398.
Digitaria, 289, 290, 298, 299, 300, 301, 302, 303.
Didymella, 361, 504.
Didymochaeta, 510.
Didymosphaeria, 361.
Dimorphostachys, 290, 291.
Diodia, 493.
Diospyros, 492.
Dipladenia, 496.
Diplocea, 562, 563.

Diplocladium, 364.
Diplodina, 510.
Distichlis, 338.
Distichium, 398.
Ditasis, 270, 271.
Ditassa, 498, 499.
Ditrypella, 364.
Dodecatheon, 491.
Doellingeria, 620.
Douglasia, 277.
Draba, 208.
Dracaena, 358.
Drosera, 553.
Dryopteris, 357, 598, 599, 600, 603, 604.

Eatonia, 487.
Echinochloa, 291.
Echites, 496.
Echium, 356.
Eclipta, 494.
Elaphomyces, 501.
Eleocharis, 339, 392.
Elephantopus, 493.
Elymus, 339.
Emmenanthe, 380, 381.
Encalypta, 398.
Entada, 65, 66, 71, 72.
Entodon, 518.
Epilobium, 209.
Equisetum, 487.
Eragrostis, 487.
Erigenia, 491.
Erigeron, 121, 200, 270, 271, 628.
Eriocarpum, 119, 120.
Eriochloa, 290.
Eriogonum, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 614.
Eriophyllum, 270.
Eryngium, 506.
Erythronium, 488.
Euchroma, 268, 269.
Euonymus, 490.
Eupatorium, 118, 355, 493.
Euphorbia, 353, 354, 467, 468, 490, 512, 513, 605, 613, 614, 615, 616.
Eurhynchium, 221, 222, 223, 225, 226, 228, 229, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 253, 254, 255, 256.
Eusicyos, 310.
Eustachys, 432, 431, 446, 447, 448, 449, 450.
Exoascus, 332, 576.

Fabroleskea, 108, 109.
Fabronia, 109.
Falcata, 574.
Fallugia, 306.
Fendlera, 626.
Fendlerella, 626.
Fenestella, 506.
Ferula, 356.
Ficus, 573.
Fischeria, 497.
Fissidens, 398.
Fomes, 513.
Forsteronia, 495.
Forcipella, 150, 621.
Fossombronia, 415.
Fragaria, 56, 167, 194.
Frasera, 509, 510.
Frullania, 416.
Funaria, 398, 403.
Fusicoccum, 509.

Gackstrōmia, 420.
Gaillardia, 215.
Galax, 100.
Galium, 209, 215, 627.
Galpinsia, 317.
Gamnanthe, 425, 429.
Gaultheria, 382.
Gaura, 307, 617.
Gentiana, 209, 215, 216, 276, 277, 544, 545.
Geranium, 155, 195, 196, 197, 198, 210, 490.
Gerardia, 492, 618, 619.
Geum, 56.
Gibbesia, 321.
Gilia, 278, 279, 546, 547.
Gladiolus, 356.
Glottium, 365.
Gnaphalium, 366.
Gnomonia 361.
Gomphocarpus, 30.
Gomphidius, 326.
Gonolobus, 500.
Gothofreda, 497.
Gottschea, 428, 429.
Grimmia, 398.
Grindelia, 120.
Gymnanthe, 425, 431.
Gymnosporangium, 331, 332, 553, 576.
Gyrostachys, 609, 610.

Habenaria, 216, 356, 488.
Haematococcus, 517.
Halictus, 460.
Hariotiella, 416.
Harpalejeunea, 416, 419.
Harpidium, 519.
Hedysarum, 215.
Helianthus, 213, 479, 480, 481, 494, 550.
Heliotropium, 141, 155, 356.
Helminthostachys, 522, 523.
Hendersonia, 510.
Herberta, 419.
Heteranthera, 488.
Heuchera, 466, 467, 489.
Hibiscus, 135, 136, 399, 490, 491.
Hieracium, 148.
Hippuris, 209.

Holodiscus, 194, 195.
Homostegia, 506.
Hookeria, 517.
Hordeum, 215.
Horkelia, 54, 55, 56.

Hydrangea, 148, 149.
Hydrocotyle, 491.
Hydrophyllum, 267, 492, 555, 582.
Hygrophorus, 322, 323.
Hymenachne, 291.
Hymenopappus, 200, 201, 378, 379.
Hypericum, 470, 491, 616.
Hypholoma, 325, 326.
Hypomyces, 327, 328, 363, 364.
Hysterium, 366.
Hypnum, 222, 223, 224, 225, 226, 227, 228, 229, 231, 233, 234, 237, 238, 240, 243, 245, 246, 247, 249, 250, 251, 252, 253, 256, 398, 518, 519, 583.

Ichnanthus, 290, 291.
Ilex, 357, 362, 490.
Impatiens, 385.
Ipomoea, 402, 492.
Iris, 488.
Irpex, 513.
Isachne, 290.
Isaria, 512.
Isothecium, 250, 251, 252, 253, 254, 256.
Itea, 490.

Jamesoniella, 416.
Jungermania, 96, 98, 99, 102, 409, 410, 411, 413, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 427, 428, 429, 524.
Juniperus, 358.

Kalmia, 399, 552, 581.
Kneiffia, 491, 631.
Kneiffiella, 630, 631.
Koellia, 470.
Kraunhia, 134, 135.
Krynitzkia, 202.

Lacinaria, 118, 119, 472, 473, 474, 482.
Lactarius, 327, 369.
Lactuca, 210.
Laphamia, 122.
Lathyrus, 215, 490.
Laubertia, 496.
Laurus, 357.
Lecanora, 632.
Lecidea, 632.
Ledum, 216.
Leiomitra, 429.
Leioscyphus, 426.
Leiphaimos, 544.
Lejeunea, 416, 419.
Lemna, 594.
Leperoma, 419.
Lepidium, 258, 259.
Lepidolaena, 416, 420.
Lepidozia, 420.
Lepicolea, 419.
Lepiota, 368.
Leptobryum, 398.
Leptodactylon, 546.
Leptosphaeria, 361, 362.
Leskea, 398.
Lesquerella, 205, 260.
Leucanthemum, 215, 555.
Leucodon, 398.
Lewisia, 208.
Lichen, 524.
Limonium, 317, 318.
Linaria, 353.
Linnaea, 215.
Linum, 452, 453, 627.
Lippia, 492.
Liriodendron, 504.
Lisianthus, 545.
Lobelia, 216.
Lonicera, 209, 502.
Lophidium, 513.
Lophiostoma, 503, 504.
Lophocolea, 417, 421, 422, 423, 424.
Lophodermium, 365, 366.
Lupinus, 204, 265, 266.
Lycopodium, 126, 132, 133, 209, 518, 519.
Lygodium, 518.
Lysimachia, 491.

MacDougalia, 629.
Macrosporium, 509.
Madotheca, 95, 96, 98, 99, 100, 428.
Magnolia, 360, 489, 505, 509.
Mandevilla, 496.
Marchantia, 424, 425.
Marilaunidium, 142, 262.
Marshallia, 482.
Marsilea, 551.
Marsupidium, 425, 430.
Martynia, 453, 454.
Mastigophora, 420.
Matayba, 336.
Meibomia, 367, 490.
Melanconis, 505.
Melanomma, 502.
Melanthium, 606, 607.
Melia, 365, 487.
Melothria, 482, 483, 484.
Menispora, 512.
Mentzelia, 199, 260, 261, 262, 275.
Merisachn , 562, 563.
Mesadenia, 494.
Metasphaeria, 362.
Metastelma, 497.
Meteorium, 517.
Metzgeria, 410, 426.

Micrampelis, 493.
Microcalyx, 492.
Microglossum, 328.
Micromeria, 355.
Mimosa, 69.
Mitostigma, 497.
Mnium, 398.
Monarda, 263, 264, 470.
Monotropsis, 344.
Montagnella, 513.
Muhlenbergia, 487.
Mylia, 426.
Myosotis, 356.
Myrica, 357.
Myriophyllum, 491.
Myurella, 398.
Myurium, 222, 226.
Myuroclada, 227.

Nama, 262.
Naucoria, 324.
Neckera, 398.
Nectria, 364, 365, 512.
Negundo, 503, 508.
Neillia, 581, 626.
Nephrodium, 601.
Nephrolepis, 601.
Neptunia, 138.
Nitella, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 164.
Nostoc, 3, 6, 7, 9, 10.
Noteroclada, 409, 410.
Nothacerates, 37.
Notholaena, 356.
Notothylas, 3, 11, 20, 21, 22, 23, 27, 163.
Nummularia, 364.
Nymphaea, 465, 489.

Ocotea, 357.
Odontia, 631.
Oligoron, 30, 32.
Omphalia, 323, 370.
Oncophorus, 398.
Onoclea, 93, 486, 522, 523.
Oonopsis, 376.
Ophiobolus, 504.
Ophioglossum, 556.
Opulaster, 581, 626.
Opuntia, 356, 491.
Oreocarya, 202.
Orthocarpus, 209.
Orthothecium, 398.
Orthotrichum, 109.
Osmunda, 522, 523, 524, 525, 526, 527, 528, 556, 597, 603.
Otanema, 31.
Otaria, 30.
Oxalis, 611, 612, 613.

Oxypteryx, 38.
Oxystelma, 497.
Oxytheca, 53.
Oxytropis, 215, 491.

Pachypodium, 265.
Panicularia, 487.
Panicum, 83, 84, 85, 86, 107, 211, 289, 290, 291, 293, 295, 297, 298, 299, 300, 301, 303, 339, 487.
Panus, 370, 371.
Parnassia, 215, 399.
Paronychia, 150, 621.
Parryella, 457.
Parthenium, 400.
Paspalum, 290, 291, 299, 301.
Passiflora, 71, 491.
Patinella, 514.

Paullinia, 212, 337.
Peltandra, 553.
Pentstemon, 216, 279, 280, 281, 379, 380, 470, 471, 547, 548.
Peperomia, 568.
Peronspora, 573, 574.
Persea, 357.
Peziculа, 506.
Phacelia, 136, 141, 277, 457, 458, 492.
Phaeopeziza, 507.
Phallus, 524.
Philadelphus, 374, 452.
Philibertia, 497.
Philonotis, 398.
Phlox, 278, 366, 492.
Phoebe, 357.
Phoma, 508, 509.
Phoenix, 358.
Phyllanthus, 490.
Phyllogonium, 518.
Phyllosticta, 367, 552.
Physalospora, 362, 514.
Physcomitrium, 403.
Physostegia, 492 613.
Phytophthora, 160, 161, 162.
Picea, 345.
Picradenia, 378, 379, 629.
Picris, 355, 491.
Pigafettoa, 426.
Pilobolus, 331.
Pinus, 345, 487.
Piper, 566.
Pistacia, 358.
Plagiochila, 409, 425, 426, 427, 428.
Planera, 518.
Plasmodiophora, 577.
Platanus, 512.
Pleocnemia, 601.
Pleomassaria, 505.
Pleospora, 514.
Plowrightia, 328.
Podostemma, 171.
Pohlia, 398.
Polanisia, 489.
Polygala, 140.
Polygonella, 41.

Polygonum, 41, 209, 489.
Polymnia, 493.
Polyotus, 30, 32, 33, 36, 416, 420.
Polypodium, 357, 601, 602.
Polyporus, 364, 513.
Polytrichum, 398.
Pontederia, 488.
Potamogeton, 487.
Populus, 502, 503, 510, 514.
Porella, 95, 96, 97, 98, 99, 100, 101, 102, 103, 183, 428.
Porotrichum, 518.
Portulaca, 400, 577.
Potentilla, 54, 55, 56, 208, 212, 215, 490, 573.
Primula, 319, 320.
Proserpinaca, 491.
Prosopis, 456.
Prunus, 149, 150, 357, 401, 511, 576.
Pseudoleskea, 398.
Pseudoneura, 410.
Pseudotsuga, 91, 165.
Pterigynandrum, 234, 398.
Pteris, 357, 523, 596, 597.
Pterophyes, 357.
Püloria, 123.
Ptychophyllum, 291.
Puccinia, 159, 331, 335, 508, 575, 622, 623.
Pycnodon, 631.
Pyrenacantha, 409.
Pyrenochaeta, 510.
Pylaisia, 398.
Pyrola, 212.

Quercus, 512, 514.

Radula, 428.
Ranunculus, 489, 580, 581.
Rauwolfia, 495.
Ravenelia, 508.
Razoumofskya, 556.
Reseda, 356.
Retama, 356.
Rhamnus, 633.
Rhexia, 468, 489.
Rhinanthus, 209.
Rhizobium, 577.
Rhizogonium, 518.
Rhododendron, 491.
Riccardia, 410, 411, 412.
Riccia, 25, 184, 186, 187, 188, 189.
Rhynchospora, 488, 600.
Rhynchostegium, 222, 225, 238, 250, 519.
Robinia, 490.
Romulea, 356.
Rosa, 152, 215, 490.
Rotala, 491.
Rubia, 354.
Rubus, 210, 490.
Rudbeckia, 215, 478, 479.
Ruellia, 492.
Rumex, 283, 489, 509, 549.
Rusbyanthus, 545.
Russula, 370.

Sabal, 360, 361, 594.
Sagina, 489.
Salix, 209, 488, 505, 580.
Salvia, 355.
Sambucus, 309, 310, 493.
Sarcomitrium, 411.
Saururus, 401.
Savastana, 104, 105.
Saxifraga, 316, 317, 391.
Scapania, 183, 184, 425.
Schistochila, 428, 429.
Schizachyrium, 83.
Scirpus, 214, 488.
Scleropodium, 229, 233.
Scolecotrichum, 366.
Scrophularia, 308.
Scutellaria, 142, 143, 144, 283.
Secondatia, 496.
Sedum, 357, 489.
Selaginella, 125, 126, 127, 128, 129, 130, 131, 132, 511, 541.
Selinocarpus, 304.
Sempervivum, 357.
Sendtnera, 419.
Senecio, 122, 147, 148, 212, 213, 355, 357, 358, 379, 549.
Senna, 554.
Septoria, 368.
Sericocarpus, 620.
Serjania, 212, 336, 337.
Setaria, 107.
Shepherdia, 215.
Sherardia, 354.
Sicyos, 310.
Sida, 468, 490, 606.
Silene, 216, 368, 489.
Silphium, 145, 146, 478, 493.
Siphonychia, 150, 621.
Sisymbrium, 456, 460.
Smilax, 605, 607, 608, 609.
Solenia, 326.
Solidago, 377, 378, 474, 475, 476, 477, 478, 493, 549, 619.
Sonchus, 209.
Sophia, 455, 460.

Spartina, 338, 339, 487.
Sphaeralcea, 306, 307.
Sphaerella, 504.
Sphaeria, 361, 362.
Sphaeropsis, 327, 360, 361, 509, 553.
Sphagnum, 519.
Spigelia, 542, 543.
Spiraea, 210, 581, 627.
Sporobolus, 87, 88, 89, 338, 487.
Sporonema, 363.
Sporotrichum, 555.
Stachys, 581, 582.

Statice, 355.
Steganosporium, 326, 327.
Stemmadenia, 495.
Stenanthium, 488.
Stephanomeria, 124.
Stereodon, 398.
Streptanthus, 265.
Stropharia, 326.
Strophostyles, 490.
Struthiopteris, 522, 524.
Stylosanthes, 344.
Symbolanthus, 545.
Symplocarpus, 553.
Synchytrium, 574.
Synosma, 494.
Syntherisma, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302.

Tabernaemontana, 495.
Tamarix, 358.
Targionia, 21, 101.
Tassadia, 498.
Taxodium, 555.
Taxus, 553.
Teichospora, 503.
Teline, 356.
Temnomia, 415.
Tetraneuris, 629.
Thalictrum, 136, 137.
Thelephora, 371, 631.
Thelopsis, 632.
Thelypodium, 265.
Thuidium, 398.
Timmia, 398.
Tissa, 489.
Tithymalopsis, 614, 615.
Triadenum, 140, 141.
Trichachne, 291.
Trichocolea, 414, 429.
Tricholaena, 290, 291.
Tricholoma, 321.
Trichomanes, 356, 604
Trichophyllum, 270.
Trichosphaeria, 363.
Tricuspis, 563.
Trillium, 488, 550.
Triodia, 561.
Triosteum, 214.
Triplasis, 561, 562, 563, 564, 565.
Tripsacum, 290, 487.
Trogia, 324.
Tropaeolum, 356.
Troximon, 215.
Tsuga, 345, 550, 621.
Tylimanthus, 429, 431.

Ulmaria, 490.
Ulmus, 518.
Umbellularia, 632.
Uniola, 488.
Uralepis, 563, 565.
Uromyces, 507, 508.
Urospermum, 355.
Urtica, 511.
Urvillea, 212.
Ustilago, 575.
Utricularia, 515, 516.

Vailia, 500, 542.
Vaillantia, 354.
Valsa, 364, 506.
Valsaria, 363.
Valeriana, 216, 269, 270.
Verbena, 262, 263, 617, 618.
Verbesina, 494.
Vernonia, 144, 145.
Vicia, 373, 374.
Vilfa, 88.
Vincetoxicum, 492, 499.
Viola, 208, 358, 491.
Visnea, 357.
Vitis, 342, 343, 401, 490.
Voyria, 544.

Waldsteinia, 137, 138.
Whipplea, 626.
Willoughbya, 493.
Woodwardia, 597.
Wootonia, 121, 122.
Wulfenia, 281, 282.

Xanthisma, 155.

Zea, 71.
Zinnia, 615.
Zizania, 487.
Zignoella, 502, 503.
Zygadenus, 209.

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CONTENTS

Revision of the Bermuda Ferns: *Benjamin D. Gilbert* 593
Studies in the Botany of the Southeastern United States.—XV: *John K. Small* . . 605
Exposure and fungous Diseases: *Byron D. Halsted* 620
New and interesting Plants from Western North America.—IV.: *A. A. Heller* . . 626
Two recently named Genera of Basidiomycetes: *Lucien M. Underwood* 630
New Species of Lichens from Southern California determined by Professor W. Nylander: *H. E. Hasse* 632
INDEX TO RECENT LITERATURE RELATING TO AMERICAN BOTANY 634
Subject Index 641
Generic Index 643

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